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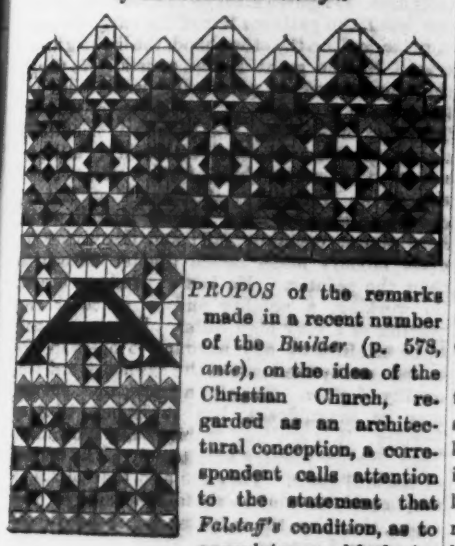
On Coloured Lights, as an Integral Part of Architectural Design.



APROPOS of the remarks made in a recent number of the *Builder* (p. 578, *ante*), on the idea of the Christian Church, regarded as an architectural conception, a correspondent calls attention to the statement that *Falstaff's* condition, as to acquaintance with the inside of a church, is far more general than people are ready to admit, even in this church-going and church-building age. Nay, more, to the hoary reprobate "the inside of a church" was evidently something once seen, although but dimly remembered. But the position of our contributor is, that most of those whose ecclesiastical pilgrimages are confined within the shores of Great Britain never *have* actually seen the inside of a church, as it was conceived and wrought out by the great church-builders of England, from the time of Edward (King and Confessor), down to the destructive reign of red-handed Harry Tudor.

The suggestion may be put in a humorous form; but there is a meaning in it which deserves careful thought. Our own pages have not unfrequently contained articles on the subject of illumination. The importance of that condition while viewing any work of art cannot be over-rated. Has a reader ever paid a visit to the National Gallery, or to any great collection of pictures, when they are half-hidden beneath the veil of a London fog? What becomes of brilliancy of touch, of purity of tone,—even of delicate grace of drawing,—under the disfiguring absence of light? In sculpture, the effect of lighting is far more important than in painting, for, in the latter, it is only dimness of effect that is produced by want of light, while in sculpture positive distortion of the sculptor's idea is produced by throwing the shadows the wrong way. That a piece of sculpture, whether in relief or in the round, should be entirely executed in one light, and viewed, when finished, in that same light, is a *sine qua non* of excellence. It is possible to make some exception to this rule in favour of what may be called chamber sculpture. Thus, the exquisite proportion of the whole figure (except the head and restored hands) of the Venus dei Medici is so perfect that, like a living beautiful woman, she can hardly be viewed amiss, in any light or in any direction. It would be difficult to say which was the artist's point of view for this particular statue. Nor have its loving custodians been able to solve the difficulty; so they have reflected the matchless curves by a girdle of radiating mirrors. Still, even the Venus, if lighted only by a lamp placed at her feet, would not maintain her fame. Again, in architecture, the effect both of outline and of shadow lines is so varied, owing to the incidence of the sun, and, again, the harmony of the colour of a building so depends, both on its relation to other features of the landscape, and on the incidence of light, that the power of illumination in giving character to architecture is hardly less than in the case of sculpture.

Thus far, then, as to the incidence, and as to the quantity of light. But no less attention should be paid to its colour. Colour is, as we know, the effect of certain conditions affecting either the transmission or the reflection of light. Our attention, since anything like a revival of art has taken place among us, has been almost wholly devoted, as far as the effects of colour are concerned, to the action of reflection. The colours of a picture are reflected colours. But the great church-builders to whom we have referred took the opposite view. They gave, so far as we can now gather from the relics of their finest works, but little attention to reflected colour. Their chief reflecting surface was gold. But over gold or marble, canopy and shrine, sculptured saint and carved foliage, a glow of rich harmonious light was thrown by the glorious stained glass with which they filled their windows.

As to this, of course it may be said that the remark is by no means perfectly novel. No doubt that is so. But what we think is novel,—or at least has been pretty generally neglected for three hundred years and more,—is that the windows of our churches grew up as integral parts of the structure, glass and all. It was not one man that built, and left the painter and glazier to come after him and improve and ornament at pleasure. On the contrary, the glass-stainer grew in his art as the builder did in his. The modification in the form, the proportion, and the distribution of the lights, that took place from the time when church windows were simply double splayed holes in the wall, too small to allow the hostile Dane to squeeze through, to that when the whole end of a church or side of a building was one great frame filled with sparkling window jewelry, was accompanied by modifications in the tints, the leading, and the pattern of the glass, which were accurately proportioned to the conception of the framework of the window. Grave and solemn in hue, or bright and sparkling in lustre, the window was not an impertinence or an excrescence, but an integral part of harmonious interior design.

Windows, no doubt, when objects of beauty, are things to be looked at. But that was not the original aim or object of the window. One of the few buildings in which the idea of the original architect, in so far as it comprised the effect of the windows (though some restorations have since unhappily been effected), may yet be observed, is the "Dome of the Rock," at Jerusalem. The glorious Saracenic stained glass yet remaining, to a great extent, in the windows of that building, forms an integral part of the structural effect. You do not go to look at the windows. The absence of figure subjects which here occurs is in this respect a true architectural feature. You are impressed by the solemn air of the holy place; and how much of the impression is due to lofty height, or noble proportion, and how much to the flood of toned light, you do not pause to inquire.

If our old cathedrals and churches are regarded from this point of view, it is impossible to deny that very few of them have ever been seen by any of the present generation as they were intended to be seen by the builders. At York we have, perhaps, one of the most striking exceptions; and who that has worshipped there has failed to be struck by the wonderful grandeur of York Minster? The beautiful group of five lancet windows, known as the Five Sisters, in the north transept, filled with glass covered with foliage, and displaying geometric forms, is of the thirteenth century. In the vestibule of the chapter-house is to be found glass of the twelfth century. The east window of the choir and the west window of the nave date in the first decade of the fifteenth century. In the north choir aisle the glass in the Archbishop's window is not more than twenty-five years later. The sixteenth-century glass in the Jesse window, in the south choir aisle, is of the same date as the Perpendicular tracery of the window itself. To a very unusual degree we can thus see York as it was seen by its builders and early adorners, and we may refer those who doubt the truth of the remarks we have made to the test of the effect produced on the mind of a man of taste, or of religious sentiment, by the interior of York.

If we look to such examples as the choir of the cathedral of Clermont, or the Sainte Chapelle at Paris (the visitor to the South Kensington Museum may wonder at the sacrilege which has enabled him to form an opinion of the solemn grandeur of this work), we see examples of a very different employment of glass by the architect from that which prevailed at York. At the Minster, if we are correct in our recollection, the windows of Thornton of Coventry, and other great window jewellers, were intended to light the church. In the French sanctuaries this could hardly be said to be the case. Semi-luminous pictures, the windows were rather architectural features than points of irradiation; and the worshippers must have depended in no small measure for their observance of the ritual on the silver lamps that hung from the roof, or on the candles on the altar. "A dim religious light," even at noon-day, is all that was transmitted by windows such as those of the chapel of St. Louis. Can there be a stronger contrast conceivable than that between the effect of glass

like this, and that of some of the modern transparency painting that disfigures both the cathedral of the metropolitan, and the cathedral of the metropolis?

Some illustration of the truth of these remarks may be obtained by any of our readers who have the chance of paying a visit to the Church of St. Nicholas at Guildford. This building, the third which has been erected on the same ancient site, is an example of that ready response of the parishioners, and of the personal friends of the lamented founder, the late Rev. Dr. Monsell, to an appeal made by the latter, then rector of the parish, to which he was himself one of the most munificent respondents. St. Nicholas has an especial claim on the attention of the ecclesiastical architect, from the mode in which the More Chapel, the ancient cemetery of the family of which Sir Thomas More was a cadet, has been combined with the south aisle of the church; the small arcade which exposes the chapel to view being filled with plate glass, so as to separate, from a sanitary point of view, the buildings which are architecturally one. There are many points of interest, as well as one or two deserving of pointed criticism, in the architecture of St. Nicholas'; but the point which we have now in view is the effect which has been produced in the interior by the successive filling up of the greater number of the windows with stained glass. The windows of the choir, or rather of the semi-octagonal apse which holds the communion-table, were the gift of the Monsell family. They have the disadvantage of being crowded with small figure subjects, poorly treated, and of containing a proportion of clear glass wholly inconsistent with the Early English form of the apertures. When the church was first opened, the effect was anything but satisfactory; and the want of harmony between glass and structure was after a time made more painful by the introduction of a reredos in gilded wood, of which the less that is said the better. But after a time, the west windows of the church were filled with stained glass of more appropriate design, as a memorial to Dr. Monsell. Then the south aisle windows were filled in the same way, as a memorial to the successor of Dr. Monsell in the living, the Rev. W. J. Few. And lastly, within the past week or two, the four windows of the north aisle have been filled with figure illustrations of the *Te Deum*, as a gift from a gentleman of the neighbourhood.

The point to which we now wish to call attention is the gradual change in the effect of the interior of the church produced by these successive additions to its coloured shade. As each new series of windows has been introduced, those previously inserted have become more admirable. The north aisle, the lowest part of the building, lying between a block which covers the very awkward entrance (the worst feature of the church) and the transept-like recess occupied by the organ, had a painfully mean look, which is removed by the effect of the windows. Nor is the improvement local alone. The harmony of the interior has become far more pronounced. Each additional coloured light seems to have reflected something of its own richness on its neighbours. Even the unacceptable bits of white (or rather of transparent) glass in the choir windows are greatly toned down. And all that now absolutely pains the eye in transmission is the raw and badly-tinted light that comes through the circular window on the south side of the tower, and through the upper row of clearstory windows. These windows at present remain as they were originally filled with glass,—that is to say, in the manner most detrimental to the general effect of the church, and most unpleasant to the eyes. They consist of transparent glass, a certain proportion of the panes being of a greenish tint that increases the sickly tone of the brick-work lining of the interior.

The circular window is now about to be filled with stained glass by subscription. If this prove as great an advance on the *Te Deum* windows as the latter are on the former stained glass, the church will be well worth a pilgrimage to visit. Then, too, if his visit be on Sunday, or on some holy eve, and if the rector occupy the pulpit, the visitor will hear such words as might have fallen from the lips of the greatest preachers of the English Church, when our language was that of Shakspeare, and the minds of men were aglow with the vivid growth of the Reformation. The only source of light remaining to disturb the general harmony, when the rose window is stained, will be the window of the More Chapel, in which the blank shields left by the glazier, fifty-four out of sixty-six, ought to be filled with armorial bearings, and the before-noted clearstory windows (we except, of course, the oak panelling and tabernacle work which is required for the lining of the apse). As to these, if they were filled with stained glass, the church would probably be too dark. But the clear glass, and especially the green glass, should be removed, and its place supplied by dead white glass, as at York, with a small and lustrous quartette of window gems,—ruby, topaz, sapphire, and emerald,—in each light; just enough to show that rich colour was the tone of the illumination, although in this part of the building but a small quantity of colour was required. The problem of illumination and of effect combined would thus be solved.

In the four *Te Deum* windows there is much which reflects high credit on the artists. The two figures of St. Augustine and St. Nicholas, as representatives of "the Holy Church throughout all the world," are really noble. Starting from the west, the first three-light window contains the Apostles Peter and John, with an angel in the centre light,—and a very charming angel it is. With this exception, the celestial personages are less happy in their treatment than any other portion of the work. The second window contains the Prophets, Isaiah and Ezekiel, with Michael the Archangel in the midst. This latter figure leads one to ask,—how is it possible that artists who have evidently given so much thought to the subject should have dreamed of attempting any other representation of the Archangel than a reproduction of the St. Michael of Perugino, in the left hand compartment of that altar-piece in the National Gallery, which is numbered 288 in the catalogue? This figure is noble and imaginative, and at the same has a sort of Mediæval quaintness in force and general effect, which might be admirably rendered on glass, in which material the maintenance of a certain degree of conventionalism is, in our opinion, indispensable. St. Catherine and St. Stephen, in the third window, represent "the noble army of martyrs." Between them is a cherub, which is the same design as the seraph in the fourth window, with the exception that the colour differs, and that the seraph is objectionably besprinkled with human eyes. These, no doubt, are introduced to refer to the eyes mentioned in the vision of Ezekiel as being in the wings,—"their wings were full of eyes about them four." In the vision of St. John, the four living creatures were "full of eyes within"; but this description is materially different from that of the four-faced living creatures of Ezekiel, or the six-winged seraphim of Isaiah. It is a thousand pities, we think, that a symbolism which is not distinctly described, and to which pictorial art refuses to lend itself with any propriety, should here have been adopted. The windows are so good, the colour of the glass is so pure, much of the design is so admirable, and the example of the donor, Mr. Chester, is so much to be commended and imitated, that we are reluctant to speak out about those celestial impersonations. But it is due to artists of merit to warn them against an attempt at evolving from their own imaginations representations of these mystic forms. We have pointed out whence is to be derived an unexceptionable pattern for the archangel. For the cherub we might point to St. Paul's Cathedral, and to the lovely choir of boy-angels, the work of Grinling Gibbons, that cluster in twos and threes, regarding invisible music-books, and uttering a perpetual *Sanctus* that finds an echo in the sculptor's ear. For the seraph some hint might have been found in the Assyrian sculpture, where, indeed, the very name of cherub has been found associated with winged sphinxes. Or, if the artist had sought to embody the most lofty, because the least detailed, of the records given in Holy Writ of these celestial symbols, he would have found in the *petasus* and the *talaria* of the messenger of the gods an indication of the mode in which the greatest artists of the highest time of art rendered the idea, "with twain he covered his face, and with twain he covered his feet." The effect of the composition of these figures as they have been actually treated, is so disjointed that the idea of unity is almost lost.

We have dwelt at more length than we should otherwise have done on this series of windows because the mode in which the Church of St. Nicholas has been successively adorned by the piety and the munificence of so many donors, in so short a period of time, may be taken to mark almost a new era in the application of decoration to church architecture. That rich and appropriate decoration should be thus introduced is the desire of all true lovers of art, and we think, of the truest friends of the Church. But the more fully this is the case, the greater is the necessity to watch against the introduction, owing to the mistaken taste of any individual, of the grotesque, or even of the abominable. Among the latter may be mentioned certain dragons or other infernal monsters, the depiction of which on the walls of a rather notorious church will be fresh in the memory of many. From the sublime to the ridiculous we know the distance. About the same space separates the quaint from the odious. Whether it be desirable, even if possible, exactly to reproduce ancient portraitures of saint or martyr, angel or cherub, may, perhaps, be questioned. Our own taste points most strongly to the use of such noble floriated or geometric patterns for windows as those of the Dome of the Rock, or as the groundwork of the Brunel, Stephenson, and Lock windows in Westminster Abbey, in preference to figures. If figures must be had, we have, on the one hand, the patterns left of the early workers in glass, and, on the other hand, the limiting lines traced by the great Italian artists. We think that any worker on glass who would wish to leave such a name as, for example, that of Thornton of Coventry, should bear in mind that the imagination of a nineteenth-century artist is not strong enough to bring forth a new conception of an ancient symbol,—such as that of cherub or seraph. The painter himself would here almost certainly fail; and the worker in glass labours under much greater difficulties than the painter. He has to work in bonds. So working, a nobility and a grandeur are possible of a very high order. But they are not to be attained by any attempt to overleap the bounds set by the leads of the casement, and the quality of glass. To paint a transparent picture may be magnificent, but it is not window jewelry. It is not true architectural decoration. True window jewelry admits only of the colours of natural gems. They are also the colours of the herald, as well as those of astrology. The topaz, the ruby, the sapphire, the amethyst, and the emerald give or, gules, azure, purpure, and vert. Sable is given by the leads, and the white glass should have the effect of pearl, which, in the blazonry of gems, denotes argent. If we admit that dark-browns or semi-opaque purples may be introduced into windows,—which, if at all, is only allowable when the illuminated space is of very great area, as in the case of the south window of Westminster Hall,—Saint Augustine and Saint Nicholas, in the windows of the church we have named, may be pointed to as examples of what the workers of the present day can do in glass of which any church may be proud. All the more are we desirous that men who can turn out such thorough and noble work should not allow themselves to be seduced, under the plea of giving scope to the imagination, into the mechanical composition of impossible figures, which are neither reproductions of old glass, nor happy attempts at giving embodiment to poetic ideas.

A GRAMMAR OF JAPANESE ORNAMENT.

In the enthusiasm which has sprung up of late years for Japanese art, there has been for the most part little of critical judgment or moderation. It has been a kind of craze, under the influence of which many persons have devotedly imitated or collected everything Japanese they could lay their hands upon, and worshipped the collection with a blind and touching faith. The work put forth by Mr. Cutler* exhibits a different and much more moderate and critical spirit in dealing with the subject of Japanese art. It seems, indeed, to be the first systematic attempt to look for something like principle in the style of design characteristic of Japanese art; to consider in what lies the secret of its charm, and to criticise it in an independent spirit. The author modestly disavows any claim to the possession of literary ability; but his criticisms are expressed in sufficiently clear and readable language, and are in themselves often very sound and sensible.

With the short historical sketch we will not concern ourselves especially; the matter is to be found in much more detail elsewhere, and the author does not pretend to announce any new facts. In the following chapters on

* A Grammar of Japanese Ornament and Design. With Introduction, descriptive and analytical Text. By Thomas W. Cutler, F.R.I.B.A. London: B. T. Batsford. 1880.

architecture and sculpture the characteristics of these arts as practised by the Japanese are fairly estimated; in regard to the latter subject, the author raises the question whether it is through accident or want of power that in sculpture the human figure is never correctly rendered, but only in grotesque form; he concludes it could hardly be want of power, as an artist who could draw the feathers and claws of a bird in various attitudes could have learned to draw the human hand correctly. Undoubtedly he could; and our impression has always been that, like other races who have not arrived at the highest style of civilisation, the Japanese do not, or did not, care for the human figure. In character they may be said, compared with Europeans, to be rather like children, and their art has that comparatively child-like character which aims at what is pretty and fanciful and even funny, rather than at intellectual expression. They can use the human figure in satirical caricature with considerable effect, though even here it is sometimes difficult to distinguish between what is intentional caricature or oddity and what is merely defective drawing. But they did not study the human figure as they studied birds, beasts, and fishes. When the highly-interesting collection of Japanese carvings and drawings was exhibited at the Burlington Fine Art Club, we drew attention to the fact that while there were many careful studies of the limbs, plumage, &c., of birds,—and even the actual feathers were gummed to the paper for reference as models,—no one seemed to have had a single study of any part of the human figure, made for the purpose of study, to lend for exhibition. That fact, as we said at the time, was quite sufficient to explain why the same people drew birds well and figures badly. They took pains with the former, but they did not care about the latter.

The recollection of studies from birds with the specimens of plumage appended, which were to be seen in that same collection, leads us, however, to question the entire correctness of the statement in the chapter on painting, that the Japanese rarely, if ever, draw from nature. It was clear, from the Burlington Club Exhibition, that they sometimes study from nature very closely. But, for all that, we believe Mr. Cutler's general view to be correct, that the birds, fish, and plants introduced into or sometimes constituting Japanese decoration are rather the facile repetitions of well-known and long-established types than the result of any attempt to reproduce nature. As he points out, the birds and fish, even, are rarely anatomically correct, or resembling nature in detail; they are thoroughly natural only in the remarkably happy and effective manner in which action is shown in them, and which might result rather from the habit of observation by quick-eyed intelligence than from formal copying from life on the spot. The author's general estimate of the pictorial art of the Japanese, however, we hold to be quite correct, though it would startle the faithful among Japan-worshippers. It is simply that pictorial art, as we mean it, can hardly be said to exist in Japan; "ignorant of chiaroscuro, the play of shadows, and the relief which by their use one can give to objects, scenes, and landscapes, they paint all in flat tones as one paints a vase; it is not a picture which they execute on the sized silk, it is a decoration, and it is as a decorative process that painting in Japan must be considered." They have imposed on themselves a style copied from the Chinese; and "the merit of their art, if we may call it such, lies in their method, which, by repeated copying, gives them such accuracy, such perfect touch, and such mastery over the brush. They are feeble in conception, inimitable in execution; masters in the matter of taste, when the human figure is out of the question."

When we find a writer who has directed special attention and admiration to Japanese art, speaking of it in this judiciously critical tone, we may hope that we are about to see a more intelligent estimate of it succeed to the unreasoning and blind craze against which we have more than once protested; that we shall not always find people ready to demand that some jagged lines for rocks, and some curly lines for water, and some sprigs for trees, without any perspective, linear or aërial, shall be admired as a "landscape-painting," and placed in competition with, or even as superior to, the best European landscape-painting. We have actually heard such a claim made, and have seen some of these grotesque and childish attempts at the representation of landscape lauded as evidence of the wonderful versatility of the Japanese, who could draw landscape and animals equally well. It may be hoped that even Japanese collectors are becoming a little more discriminating now, though it must be admitted that collectors as a class are hardly, perhaps, to be judged by the standard of rationality applied to mankind at large.

Mr. Cutler gives some brief chapters on the processes in ceramic ware, lacquer, metal-work, &c., which render the book more complete; and then we come to the æsthetic consideration of the subject. Some remarks in regard to the Japanese artist as a decorator are suggestive, and the brief description of the process of education of a Japanese designer helps to explain some of the peculiarities of their art:—

"A small manual of drawing, in which different designs are mapped out in squares, is placed in the hands of the student, who divides his drawing-paper into the same number of squares, which he is taught to fill up in their fixed order. When he has learned these by heart, designs of gradually-increasing difficulty are placed before him, and thus he learns by degrees to delineate flowers, birds, landscapes, figures, and other objects in an artificial manner, without any reference to nature. One student may devote himself to birds and flowers, another may take up the subject of landscape, but in all cases the method pursued is the same, and thus the excellences and faults of the originals are perpetuated. Individual talent in draughtsmanship,—looking to originality of design,—can scarcely exist. The excellences of artists are therefore confined to the combination of conventional forms, and the delicacy or power of execution and colour, in which alone their fancy can have free play. These elegant stems, these feathery petals, are thus executed after a number of models prepared long beforehand, and which every painter possesses."

Admitting this description to be true (and we have no doubt it is) we are in a position to estimate Japanese art very differently from the view we might take of it if we regarded it as an art independently practised by individuals. Like so much of the best decoration in the world, it is, in fact, a kind of artistic school or habit of design, carried to great perfection of finish through the practice and teaching of many generations. In considering it as a style of art for study and emulation by European artists, therefore, we may reduce it to a comparatively few types, and we may then find room to consider whether, if we wish to reproduce for ourselves the effect of ornament of this type, we may not find a better and more living method of doing so, in ourselves adopting our own types and refining and finishing the execution of them to the highest point, and then applying our own details to the production of ornament on the same principle, but with novelty of detail. This would be more interesting and more likely to benefit and advance decorative design in new paths, than merely aiming at a mimicry of Japanese work. In analysing the elements of Japanese design, the author reduces them to certain leading groups. First we have diapers, frets, and medallions, not imitative of nature, and in some respects resembling forms that are found in Greek and Egyptian art. Next we have free-hand curve lines, made with single brush strokes; then a graduated series of studies from the bamboo, one of the most prominent and frequent objects in Japanese decoration. Following these are plates of studies in grasses, flowers, birds, and in clouds and water (so-called). These the author apparently regards as the typical divisions into which the materials of Japanese ornament fall. As to the principle of combination employed, Mr. Cutler defines it as "an avoidance of the appearance of symmetry while producing symmetrical effects, a suggestion rather than expression of proportion, an unobtrusive order, and in repetition of form an irregularity and changefulness, giving to it an unusual charm and freshness. A Japanese artist proceeding to decorate a given space would not mark out the centre and place his ornament there, nor would he divide it into equal parts, but he would most probably throw his design a little out of the centre, and cleverly balance the composition by a butterfly, a leaf, or even a spot of colour." This is perhaps about as much as can be definitely said as to the principle of Japanese design, which to superficial observers is marked apparently by want of principle and method, but which probably has so much of principle as is involved in the intentional avoidance of formality, together with the attempt to comply with the demands of symmetry (as one may say) unsymmetrically, and in a manner such as to produce the effect of a happy accident, a *contrived* accident. We believe that the highest class of decoration, that which has commanded the longest and most extended admiration, is that which is symmetrical and is precisely adapted to the space which it occupies. But we do not always want the highest or most serious class of art, either in decoration or in other forms of art; and when we are tired of the grave symmetry of the Greek, and the less grave symmetry of the Renaissance, ornament, the Japanese comes in like a child and arranges pretty things for our amusement, and seems ready to laugh with us over them. In that light, Japanese art is an exquisite element in the cycle of decorative arts, but it is not to be placed above, or on a level with, the graver, more precise, and more thoughtful ornament of the Greeks.

One other suggestion in the author's analytical chapter we may refer to. After observing that no doubt some of the Japanese work is intentionally conventional, he observes that it may be questioned "whether in their most successful work the artist is not decorative rather by accident than intent,—whether, in fact, he has not striven to produce a faithful and lifelike copy of Nature, and fallen just so far short of reaching a pictorial standard as to produce a decorative effect." This is exactly what we believe to be the case, not only in some of the Japanese work but in many other schools; in the figure-subjects of Mediæval stained glass, for instance, where we have little doubt that the object was to produce as realistic an effect as was in the artist's power. The limitations which his powers and the exigencies of his material imposed on him led to the formation of a type of design exactly suited to the material and the circumstances, and which in succeeding times came to be regarded as representing the essential conditions of good design. A great deal of the apparently conventionalised art in the world was, we suspect, realistic art to its inventors.

It remains to say a word as to the illustrations to Mr. Cutler's book, which form by far the larger portion of it, but which, being all copies from Japanese originals, do not call for criticism on this occasion, except in regard to selection and execution. In both respects they rank very high. The selections include all the leading characteristics of Japanese ornament, conventional diaper, flower, bird, and fish subjects, designs for lacquer, &c. They are very well executed,—the majority in monochrome, a few in colour,—and do great credit to the publisher, as well as to the author's care and pains in their correct and finished execution. The book will be a useful as well as a very ornamental addition to any collector's, architect's, or decorator's library.

THE GEOLOGICAL EFFECTS OF HUMAN INDUSTRY.

THE unwonted activity which the long-observed depression of part of the surface of Cheshire has shown within the past week has been a source of danger and distress to not a few residents in that industrious county. Beneath the soil of Cheshire lie those treasures of salt on which, for the last 200 years, we have been drawing, as if they were inexhaustible. But it is not as matter of quantity alone that the labour of the salt-worker has been, in the most literal sense of the word, undermining that of the agriculturist. In rock-salt beds, as in coal beds, the miner is compelled, in self-protection, to leave pillars of the mineral that he extracts, or to supply their place by props of wood or of stone, lest the whole area of the roof of his workings should come down upon him. In abandoned workings this fall of roof is not uncommon, and a savage and squalid aspect is imparted to certain regions of "the Black Country," by reason of the descent of the earth from the very surface, to fill up the places left empty by the excavation of the thick coal-seams.

Two millions of tons of salt are now drawn annually from beneath the soil of Cheshire. As the bulk thus abstracted is about equal to twice that of the embankment across the valley of the Colne, near Watford, on the London and North-Western Railway, it is pretty clear that, sooner or later, the surface of the ground must sink. But it is not the miner, with pick and shovel, who is the real cause of the most pressing danger; it is the man who employs the apparently harmless instrumentality of the pump. Drawn up in the form of brine, the salt abstracted leaves space no less mischievous than that effected by the labour of the miner; and it has the further danger of being unknown in its

locality, as well as being unrelieved by any efforts to prop or to shore. A vast amount of solid matter is daily being removed in the form of brine, from which the water is afterwards evaporated to leave a deposit of salt. The water may be replaced from perennial supplies of rain; but the salt, once gone, is irreplaceable.

It is at Dunkirk, near Northwich, the capital of the salt-manufacturing district, that the more recent and most alarming subsidence of the ground has occurred. On the 4th inst. symptoms of unusual subsidence were observed over the site of an old and disused salt-mine, at Wilton, in the channel of a brook. A little later the movement became more active, and the accounts of the phenomena which took place recall the description of the Geysers of Iceland, or of the mud springs or mud volcanoes of volcanic districts. Water rose, as from a boiling cauldron, from the shafts of the old mine; and soft mud was thrown up for 7 ft. or 8 ft. into the air. A gradual settlement of the surface, through the whole day, produced this discharge from the shaft, which acted, not as a safety-valve, but after the fashion of those hydraulic standpipes with which the water companies have made us familiar. By dawn on the 5th of December the depression of the surface had so far advanced as to form the bed of a lake into which the water of Wincham Brook rushed like a torrent, furrowing a channel of 15 ft. in depth. As the water flowed in, the surface of the new lake rose and concealed the mischief below. About four p.m. another discharge took place from the old shaft, which can only be compared to that of an active volcano. Mud and stones were thrown up into the air to the height of 30 ft., and the surface of the earth sank another 5 ft. perpendicularly. With this movement the foundations of the neighbouring salt-works gave way, and the whole building soon after collapsed. A chimney, 90 ft. high, fell with a terrible crash. It soon became known that the Platt's Hill Rock Salt Mines, fifteen acres in extent, were flooded. The subsidence was still going on when this account was despatched. The level of the River Weaver has fallen a foot, and the brooks called the Twincham and the Flasher are still running into the new lake. The only consolation that is afforded to the sufferers is the fact that no lives have been lost. Thirty years ago a somewhat similar convulsion took place, and thirty lives were then sacrificed.

Small comfort as the reflection may afford to the sufferers, there is no doubt that this depression of the soil of Cheshire is a necessary consequence of the continuous abstraction of the salt. It is only a question of time when it may occur. The salt-miners, like the coal-miners, have to balance their accounts between wealth drawn from below and outlay caused on the surface of the soil. Even if permanent lakes are formed, they may have their utility. The great thing is so to watch the indications of movements of the kind as to prevent danger to human life. It is also obvious that none but strongly-framed wooden buildings, or iron buildings, should be erected in districts where the foundations may at any time give way.

There is, however, another consideration of great interest that is suggested by the accounts which we have above reproduced. The column of water thrown up from the old shaft is described as boiling. It is not said whether any observation was made of temperature, or whether the expression merely refers to the mixture of air, or to the violence of the eruption. But the close resemblance of the phenomena to those of a real volcanic eruption will strike all those who have witnessed the latter. If the water was actually warm, the heat may be accounted for on mechanical principles. The descent of such a body of earth must have developed a great degree of heat. The relation between gravity and heat is thus illustrated. We all know that if a mass of any solid matter falls from a great height, or is projected with great velocity (as the bolt of a gun), that the force of impact developes a high temperature. One description of bomb-shell is exploded merely by the heat developed by its concussion. But we have less acquaintance with the subject of the development of heat by pressure. This, however, we must expect sometimes to occur. And the point now before our consideration is,—to what extent may we consider that the heat that is found to increase as we descend below the surface of the earth is due to the pressure of the superincumbent mass?

We have long been accustomed to consider the earth as a body once heated to a molten state, and now gradually cooling. But we are not aware whether any physicist has attempted to investigate how far the terrestrial heat may be due to the active force of gravitation. One series of experiments made of late with reference to the heat of the St. Gothard Tunnel bears strongly on this view of the subject. If we look at the case of a permanent central fire, or source of heat, we should expect to find the terrestrial heat, as measured by the thermometer, proportioned to the distance from the earth's centre of gravity. Thus the surface-heat at the poles should be considerably greater than that at the equator. And thus a boring of 100 ft. or 200 ft. below the top of a lofty mountain should be much cooler than a boring of equal depth below the surface of a plain only slightly elevated above the level of the sea.

But such is not the law of the increase of terrestrial temperature. As far as it is yet known, it is distance, not from the earth's centre of gravity, but from its superficies, that determines the local heat. At 1,000 ft. below the summit of a hill 8,000 or 10,000 ft. high, the temperature is nearly the same as that at an equal depth below a maritime plain. It is to be observed that in sinking in a valley, the temperature increases somewhat faster than in sinking on a hill. But it is also the case that the pressure must be greater in the latter than in the former case. The latest ratio of increase of heat with depth taken from Alpine observations is 1° Fahrenheit for every 88·1 ft. of depth. We recommend the study of the relation between heat and weight to the careful attention of the physicist, and we shall be glad to publish any direct information as to the temperature of the water thrown up by the subsidence of land in Cheshire.

ROMAN REMAINS AT BRADING, ISLE OF WIGHT.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

At the fourth ordinary general meeting of this Institute for the present session, held on Monday evening last, Mr. John Whichcord, F.S.A., President, in the chair, a report of the Executive Committee (Mr. John E. Price, F.S.A., and Mr. F. G. Hilton Price, F.G.S.) for the Brading excavations was read by Mr. Hilton Price. The report described the position in which the remains have been found as a remarkably fine one, situate partly on the property of Lady Oglander and partly on that of Mrs. Munns. The first part of the remains was discovered by Captain Thorp, of Yarbridge, in April last. The present excavations originated in the finding on Mrs. Munn's property such indications of Roman buildings as offered encouragement for further investigation. While fixing hurdles upon this land, walls, roof-tiles, and traces of pavement were discovered, whereupon Captain Thorp devoted considerable energy and zeal to the more complete examination of the ground. It was subsequently suggested that, in order thoroughly to explore and ascertain the full extent and nature of the buildings, excavations should be commenced on the land belonging to Lady Oglander. With the introduction of their veteran colleague Mr. C. Roach Smith (himself a native of the island), and his relative Mr. F. Roach, of Arreton, Lady Oglander kindly accorded the Committee permission to excavate. The work commenced in August last. In the description of the various chambers (of which a plan was exhibited), the Committee had affixed to each a number by which it might *pro tem.* be known, as in the present state of the excavations they thought it premature to assign any particular name or use to the respective apartments.

Chamber No. 1 measured 18 ft. by 10 ft. 6 in.; the walls on the outside were 27 in. thick, the division walls between rooms No. 2 and No. 4 being 18 in. thick. There were five flue-tiles *in situ* in the chamber, on the east and south walls; the first one was 5 ft. 3 in. from the north-eastern corner; at 5 ft. 3 in. from the first was another; the next was 6 ft. further away; the next 4 ft. and the last 4 ft. 6 in. The flue tiles were 16 in. high and 4 in. broad. In the north-west corner, 2 ft. 6 in. from the wall, were the remains of an arch, composed of flat tiles, and the entrance was 2 ft. in width. There was no pavement in this apartment. In the chamber, fragments of black pottery, of New Forest ware; many broken flue tiles; some well-faced stones, some in the form of arch stones; iron spikes and small nails, roofing slabs made of Bembridge stone, with nails in them, and other articles, were met with.

Chamber No 2 was a square chamber measuring 20 ft., paved with grey marl tesseræ, and the walls were 2 ft. thick.

Chamber No. 3 measured 15 ft. 6 in. by 17 ft. 6 in.; the ornamental centre was 9 ft. by 10 ft. 6 in., and the margins of the pavement were chequered. In this room were found fragments of wall plaster with fresco, pieces of black pottery (Samian), broken flue tiles, and other things. Fully 20 ft. of the wall on the north-east corner were wanting. The pavement presented some novelties as regarded the subjects. It was square; on the western side were two gladiators—one with a trident, the other with a net—in combat. On the north side was a fox under a tree, probably intended for a vine. A building with a cupola completed that side. On the south side, in front of a pair of steps, was a man with the head and legs of a cock; on his right hand were two griffins. In the centre was the head of Bacchus or of a Bacchante, and similar figures occupied two of the angles.

Chamber No. 4, from the entrance to the arch on the south to the pier on the north side, was 11 ft. 8 in. by 10 ft. 6 in. in width. There was no pavement in it, but at the entrance to the arch a mass of plaster material, similar to that in which the tesseræ were laid, was found; when rubbed between the fingers it was quite soft, becoming hard upon exposure to the atmosphere. In the north corner of the room was a pier of masonry 2 ft. square and 2 ft. 6 in. high; upon the top of this the base of a pillar of greensand was found; a number of pieces of black pottery, flue tiles, an iron hinge, and a large number of stone roofing slabs and vitrified stones, were also here found.

Chamber No. 5 was a long narrow room, measuring 7 ft. 6 in. in width by 20 ft. in length, paved with inch grey marl tesseræ. The chamber communicated with No. 6 by means of a passage at the east end, 4 ft. 9 in. wide. The walls were about 18 in. thick. Many fragments of wall plaster with fresco were dug out of this chamber.

Chamber No. 6 appeared to be one long apartment, because the length from the border of the pavement described in room No. 3 to the margin of the representation of Orpheus, corresponded with the length of the other side of this mosaic to the wall of the Medusa room; these dimensions were 21 ft. 10 in. respectively. The representation on the floor of Orpheus was 7 ft. 6 in. wide by 8 ft. 6 in. broad, with a well-executed border of the guilloche pattern 1 ft. wide. Orpheus was represented playing on his lyre, and wearing the Phrygian cap and flowing *pallium* or cloak; attracted by his music were animals and birds, suggesting the examples found at Woodchester, Winterton, Lincoln, and at other places. But the peculiarity of the pavement at Brading was the figure of a monkey placed near to the left shoulder of Orpheus; the monkey wore a red cap. The remainder of the chamber was paved in large red and white tesseræ in a chequered pattern. Beneath the pavement was a subway, which was covered with flat slabs of native tertiary limestone. It was 6 ft. 8 in. long, 2 ft. wide, and 3 ft. 2 in. deep; the stones forming it were of various dimensions, but corresponded in thickness, which was 8 in. The subway evidently had something to do with the heating apparatus for chambers Nos. 9 and 12, as both those chambers had suspended floors. The greater part of the wall on the eastern side of the chamber was wanting, and on the western side the wall was composed of rubble and irregularly-sized stones; just above the floor-line was a string-course of stone slabs, instead of bonding tiles. During the excavation of the chamber a considerable quantity of pottery, mostly coarse, of the variety known as Upchurch ware, was collected, but not sufficient to make up any vessel; also some pieces of a fine red ware, a sort of pseudo Samian, ornamented with incised figures of crescents, &c., of precisely the same kind as had been met with in Barge-yard, London, in Uriconium, and at Richborough. In this room and in No. 7 were a number of pieces of a large vessel, made of what resembled Portland cement, nearly ¾ in. in thickness, the inside being marked with the impress of the potter's fingers or thumbs all over. It was probably a mortarium. Some pieces of plaster with fresco upon them were picked up on the south side of the chamber, one piece 11 in. long by 6 in., representing a group of fruit in a circular medallion on straw-coloured

ground; another having a coloured bird of the parrot family, 10¼ in. long, with a margin of red and white stripes 4 in. broad.

Chamber No. 7 was intersected by the boundary line dividing Lady Oglander's property from that of Mrs. Munns, and was 20 ft. square. It was paved in squares of red and white inch tesseræ, much injured by fire. The wall separating this chamber from No. 9 was much decayed, the mortar being quite rotten, but the marks of the foundation were plainly visible.

Chamber No. 8 was apparently a square, measuring about 20 ft. by 21 ft., containing no tesseræ nor concrete floor; near the hedge or boundary line was a circular structure, 4 ft. 6 in. in diameter, formed of slabs of Bembridge stone, and coated inside with salmon-coloured mortar. At the bottom were indications of fire, in such quantity as to suggest that the place was used as a furnace or oven. The committee had not been able to explore the whole of this structure, as it ran beneath the bank and hedge. The boundary-wall on the west side was nearly 3 ft. in thickness,—a circumstance which led the committee to think that it might have been an external wall, as its thickness was so much greater than that of other walls of the buildings. There was an opening into Chamber No. 10, 3 ft. 6 in. wide.

Chamber No. 9 was 19 ft. 9 in. square; the bordering was of the usual 1 in. red and white tesseræ; in the centre was a square measuring 5 ft. 10 in., enclosing a diamond-shaped figure, with a central medallion of parti-coloured tesseræ. There was a good deal of plaster or stucco still standing upon the walls to the north and west, displaying scroll patterns of dull colours much faded.

Chamber No. 10 measured 11 ft. 6 in. by 10 ft. 5 in.; the walls were 1 ft. 9 in. in thickness. It had a raised ledge or seat on the west side, 6 in. high by 1 ft. wide, covered over with red plaster, and on the north side was another similar ledge 2 ft. 6 in. wide. Upon the floor were, *in situ*, a considerable number of flat red tiles, 1 ft. 2½ in. by 11½ in. No tesseræ were found upon this floor.

Chamber No. 11.—This was 15 ft. by 5 ft. The walls were from 1 ft. 6 in. by 1 ft. 9 in. high, and the chamber was paved with rough concrete.

Chamber No. 12 was the largest room yet met with on the site; its dimensions from east to west were 39 ft. 6 in. by 19 ft. in the western portion, and 15 ft. 6 in. in the eastern portion, and 11 ft. between the piers in the centre. The pavements in this chamber were remarkable. At the west end the mosaic pavement was almost square, its dimensions being 13 ft. 6 in. by 13 ft. 10 in., divided into compartments edged with the guilloche border in ½-in. tesseræ of white, black, and red. The design might be described as in three divisions, with a central circular medallion also bordered by the guilloche, but the subject was destroyed; sufficient, however, remained to show that it contained a similar building to that already referred to as being found depicted in the pavement of Chamber No. 3. Upon either side were oblong panels containing mythological subjects, and at the corners were semicircles enclosed in compartments; these were occupied, with the exception of one which had perished, by busts in illustration of the Four Seasons,—the missing one from the north-west corner being probably Spring. The centre of the pavement was much injured, but sufficient remained to show that the central design was contained in a circular medallion, bordered with the guilloche pattern. Around the medallion were four oblong panels, placed between the angles containing the seasons. These probably represented mythological subjects, because in the one which was tolerably well preserved appeared figures which might be recognised as Perseus and Andromeda. The eastern division of the chamber contained the largest and most important of the mosaics yet found. In the centre was a large medallion containing the head of Medusa, such as occurred both at Bignor and Bramdean. Springing from the centre were four compartments, arranged cross-wise; each of these was bordered by the guilloche pattern. At the angles north, south, east, and west were triangular compartments representing figures of bucolics blowing the *buccina*, or neat herd's horn; on their heads was the *petasus* of Mercury, and over their left shoulder was a *pallium*, or cloak. The whole of this apartment was bordered with inch red tesseræ, which contained a fret pattern laid in white, terminating at the head of the chamber in a figure of a *swastika*, or Vedic cross. The presence of this symbol upon Roman monuments had been noted upon remains previously discovered in Britain. A large quantity of plaster off the walls or ceiling was lying face downwards upon the pavement, and some of the colours on it were very bright, but none indicated any special design. There was a fair amount of plaster still adhering to the walls of the room, with fresco painting upon it representing scrolls in dull colours. The explorers also found some plaster roundels for inlaying in the wall.

Chamber No. 13 was a singular structure, consisting of rough stones, and measuring 7 ft. 9 in. long by 3 ft. 10 in. broad, and about 2 ft. deep, paved with large red tiles, similar to those found on the floor of Chamber No. 10. This structure extended on the east or seawards side, where the wall projected fully 18 in. It had been coated inside with salmon-tinted mortar, and on the east side of the compartment a wall had been inserted, which was found to be a continuation of the main wall running northwards. This addition was built of rougher masonry and common, badly-made mortar, indicating a later date. Various usages had been assigned to the chamber, amongst other suggestions being one that it was a bath; but as yet no indication of a pipe had been met with, which would probably have been the case had it been used for that purpose.

Chamber No. 14, which measured 15 ft. 4 in. by 10 ft. 2 in., had a concrete floor; the walls were low, and in certain parts the plaster still remained on the wall, which was of a dull blue colour, splashed with red and black in imitation of marble. The stucco which was dug up from off the floor, lying face downwards, as was the case throughout, was of very bright colours, but none of the fragments denoted any subjects.

Chamber No. 15 was a hypocaust, of great interest. The chamber measured 15 ft. 2 in. north and south, and 10 ft. 7 in. east and west. It contained fifty-four pillars of tiles arranged upon a floor of rough cobble stones; a large tile was placed upon the floor to carry the others, which were 8 in. square and 1 in. thick, with mortar joints 1 in. in thickness. These pillars were 2 ft. 6 in. in height, and consisted of about thirteen tiles each. On the east side of the wall were two flue-tiles *in situ*, 16 in. in length, joined together, thus making a flue of 32 in. leading to the upper portion of the room, and another on the north side. On the west side and in the southern corner was a neatly-turned arch of large flat tiles, with wide mortar joints; at the mouth of this arch a large stone of massive masonry was found placed across it. This arch might have led to the furnace on the outer side of the wall of the chamber.

Chamber No. 16 measured 17 ft. 3 in. long by 10 ft. 7 in. broad. The walls were covered originally with a red stucco, some of which still remained in patches; the floor was of concrete. A large number of flat roof slabs, 18 in. by 12 in., many with nails in them, were found amongst the *débris*, likewise a number of fragments of Durobrivian pottery, and two Samian bowls. Many worked stones were taken out of this chamber. A mortarium made of limestone, 2 in. in height and 6 in. in diameter, was found there; it had only one projection, which formed either a handle or an ornament, though it must originally have had three of them.

Chamber No. 17 was found to be 19 ft. 5 in. long from east to west, by 10 ft. 3 in. wide. The floor was composed of concrete, and the walls, which were now only about 2 ft. high, were covered with stucco, a small quantity of which still remained, the colour being a dull blue splashed with red and black. The chamber communicated with No. 18 by a stone step 1 ft. high and 2 ft. broad, situated about the middle of the wall. In the work of clearing out the fallen *débris*, several large nails or spikes varying in size from 10 in. to 13 in. were thrown out; in several instances these large spikes were removed from the tops of the walls, where they were lying in horizontal positions. The chamber was chiefly remarkable for the large quantity of window-glass it contained. The glass was of various colours, some bluish-green and some a drab colour; upon one side it was smooth and polished, while upon the other it was rough, like ground glass. The thickness of the largest pieces varied from one-eighth to a quarter of an inch. The largest piece of window-glass exhumed was 7¼ in. in length by 4 in. in width, of a brownish-white colour, and one-eighth of an inch in thickness, with a rounded selvage edge; the next largest fragment was a piece of green glass, which was three-sixteenths of an inch in thickness and 6 in. long by 3 in. in width. The explorers also met with bluish-green and yellowish-green glass, and one piece was a quarter of an inch thick near the selvage edge. One fragment had two outer edges rounded, and this might possibly afford a clue as to the manner in which the sheets were cast for fitting into the window-frames.

Chamber No. 18 measured 21 ft. 6 in. from north to south, and 18 ft. 6 in. from east to west; the floor was of concrete, with a red fillet round the margin of the wall. The stucco was still remaining in parts, and exhibited colouring of a dull blue ground, splashed with red and black in imitation of marbling, as was the case with chambers Nos. 17 and 14, and also at the Roman villa discovered at Aldborough, Yorkshire.

Chamber No. 19, which had not yet been excavated, measured 9 ft. by 10 ft. Walls had been traced for at least 100 ft. east of this chamber, disclosing many other apartments, but that area had yet to be systematically excavated. In conclusion, the Committee stated it to be their intention to recommence active operations early in the spring. By the time they were in a position to publish a second report they might be able, with the assistance of architects and antiquaries, to assign uses if not names for the various apartments.

The President, in inviting discussion, said he was sure that the meeting had heard with great satisfaction and interest the report which Mr. Hilton Price had read. He had much pleasure in introducing to the meeting another Mr. Price, a gentleman who, though not related to the reader of the paper, had been associated with him from the first in his researches. It was quite certain that the work could not be in better hands.

Mr. John E. Price, F.S.A., said it would have been apparent to all who had done him and his colleague the honour to listen to the report, that they had purposely abstained from making it other than a report to the Institute. The writers had felt that it was not within their province to go at length either into the topography of the district, or into the Roman occupation of the Isle of Wight. Perhaps the most interesting point of the whole matter was that the district near Brading should be found to abound in Roman remains. So little was known of the Roman occupation of the island, that the discovery of these remains at Brading was of exceptional interest. It was not until the present century that any trace of the Roman occupation of the island was discovered, although the information to be derived from ancient authors as to such occupation was very precise. Vespasian, in the reign of Claudius, was engaged in Germany with the Second Legion, when he was summoned by Claudius to go over and assist in the occupation of Britain; and it was on record that, after subduing Dorsetshire and Hampshire, he occupied the Isle of Wight. The committee hoped, therefore, that as the work proceeded they would succeed in finding some record of the Second Legion. Sir Henry Englefield, in his book, had stated that there was no trace of the Roman occupation to be found in the island; and it was not until 1859 that Mr. George Hillier was able to record the discovery of some Roman work in the grounds of the vicarage at Carisbrooke. With regard to the remains now laid bare at Brading, the executive committee were unable to identify the several chambers with the specific purposes for which they were used. In 1862, during the excavations for the Cowes and Newport Railway, some Roman remains were found; and in 1867 Mr. Roach Smith reported the discovery of further remains. In 1864 the discovery was made of some Roman buildings in Gurnard Bay, which curiously resembled those found at Brading. Among the things found in Gurnard Bay were merchants' marks made of lead and stamped with Roman devices, some coins of Vespasian, and others of the age of the Antonines. At Bonchurch, Shanklin, and Freshwater, Roman coins and other remains had been found. At high water Brading Haven had all the appearance of a lake. Many attempts had been made to reclaim that valuable tract of low-lying shore, but without avail. Captain Thorp was under the impression that he had discovered an ancient ford across it, and if so it would probably be found to have some con-

nexion with Centurion's Copse,—a name suggestive of military occupation. The remains at Brading were found in two fields, respectively known as the ten-acre field and the seven-acre field, both constituting such a slope of cultivated ground as would at once have commended itself to the attention of the Roman architects, whose text books contained important counsels as to the selection of sites. The walls found at Brading averaged from 3 ft. to 4 ft. high; there were none higher than 4 ft. The pavements found were constructed of tesseræ, made of native stones found on the spot,—taken from the sea-shore; and every kind of stone used for that purpose at Brading by the Romans could now be picked up in Sandown Bay or off Bembridge Ledge. With regard to the design of the pavements, too much stress was sometimes laid on the fancied motives of the *tesselarii* or makers of Roman tesselated pavements, and it was never safe to be too positive in assigning the subject of or in asserting a particular scene to be depicted on such pavements, because the men employed in the work seemed in many cases to have worked very much at random. But, nevertheless, the pavements found at Brading bore a significance that could not be mistaken,—the mythological character of their design could not be gainsaid. In conclusion, Mr. Price said the committee owed great thanks to Lady Oglander for the kind manner in which she had given permission to excavate on her land.

Major Leeds, the chairman of the committee, said that, as representing the persons locally interested in the remains, he was able to state that they were most anxious to render every possible help to architects and antiquaries who might desire to scientifically survey and explore the remains which had been found. Unfortunately there were difficulties involved in the fact that the remains had been found existing on two properties, but he hoped that arrangements would be made whereby the whole area of the buildings,—for he thought they must not merely consider the remains as simply those of a villa,—could be opened out at once. Lady Oglander was willing, and, indeed, desirous, to help in every possible way. Those locally interested felt that they owed great thanks to the Messrs. Price and to the learned societies who had assisted them, and they were very grateful to the Royal Institute of British Architects for placing their rooms at the disposal of the committee.

Mr. E. W. Brabrook, F.S.A., said that so much had been said with regard to the remains from an antiquarian point of view that he should be glad to hear what the members of the Royal Institute of British Architects had to say, and to reserve his remarks for a future occasion; for he trusted that it was not too late to hope that the matter would be fully discussed from an antiquarian point of view in another place. Messrs. Price were deserving of thanks for the manner in which they had conducted the excavations, one important lesson to be learnt from which was as to the necessity of pursuing them to the end. It appeared to him that there was a great deal more to be discovered at Brading, and it was to be hoped that the Messrs. Price would be assisted and encouraged in pursuing their explorations until they had ascertained the whole extent of the undiscovered remains which lay between what had been excavated and the seashore.

Dr. Lewis asked at what depth below the surface the Brading remains had been discovered, and as to the nature of the superincumbent soil. He and others who had had more or less experience in investigating Roman remains in this country knew that they were generally found a considerable number of feet below the surface,—from 16 ft. to 18 ft.

Mr. F. C. Penrose said that he had not pursued the subject of the domestic architecture of the Romans, and so could not enter into a detailed discussion of the paper. He would, therefore, confine his remarks to the marvellous specimens of glass which were exhibited as having been found at Brading. In Italy, as far as he remembered,—at Pompeii and elsewhere, window glass had not been found in connexion with Roman remains, doubtless because it was not needed in that climate. It had, in consequence, been tacitly assumed that the introduction of glass for windows was a mediæval or Gothic invention, and that the Roman occupants of Britain, and even the Normans, were unacquainted with glass in windows. In the pieces found at Brading, however, evidence was afforded of the use of glass in sheets of really respectable dimensions by the Romans in Britain. He should be glad to know from those who had followed up the subject of Roman antiquities in Britain whether glass had been found in other places. Some of the glass exhibited was very pellucid and of very fine colour. The remarkable preservation of the iron spikes and nails exhibited was very noteworthy.

Mr. G. H. Birch said it struck him that there was a great similarity between the remains found at Brading and those of the Roman villa at Lyme Regis.

Mr. T. Chatfeild Clarke and Mr. E. C. Robins having made a few remarks,

Mr. J. G. Waller, F.S.A., referred to the singular emblem known as the Swastika, mentioned in the report as having been found in the decorations of the Roman buildings at Brading. He said he believed he was the first person who gave it that name,—now forty years ago, getting his information about it from the papers of the Asiatic Society. The late Mr. Albert Way and himself had happened to light upon the English word for it in the same week. It occurred in one of the Harleian MSS. in the course of a few rough notes made by a gentleman for the execution of a window as a memorial of himself and his wife. The Swastika was a religious emblem amongst the Buddhists,—indeed, he believed it was the earliest religious symbol of which we had any evidence. Dr. Schliemann had found it in his excavations at Hissarlik, and had said a great deal about it, on the authority of a writer who was not to be too implicitly trusted. After all, very little was known about it, except that it was one of the most ancient, if not *the* most ancient, religious symbol of which there existed any sort of record.

Mr. Alma Tadema, R.A., said that Mr. Penrose would be interested in learning of the existence, in a museum in Rome, of two bronze frames, measuring about 2 ft. by 2 ft. 6 in., in one of which pieces of window-glass still remained. He was unable to enter more fully into the discussion, but he wished the excavators much luck.

Colonel Prendergast asked whether Mr. Price had come to any conclusion with regard to the cause of the destruction of the buildings at Brading? One curious fact was mentioned in the paper, viz., that all the plaster covered with fresco painting was found with its face downwards.

Mr. C. F. Hayward, F.S.A., with regard to the depth at which Roman remains were generally found, said that at Colchester Roman coins and other vestiges of the Roman occupation, such as cinerary urns, and even stone monuments, had been found very near the surface. Within the last few years there had been discovered there a figure of a centurion, in very high relief. The Roman walls found at Colchester were, it was to be observed, composed of a concrete made with septaria, dredged up at Harwich and in its vicinity. There was no stone whatever in the neighbourhood.

Mr. Nicholl asked whether the plaster or fine concrete floor mentioned as having been found at Brading was decorated with colour.

Mr. Hilton Price, in replying on the discussion, said that the remains at Brading were found at an average depth of 3 ft. or 4 ft.,—in some places at a rather less depth. The tops of the walls were about 18 in. beneath the surface of the ground. The pavements were about 3 ft. deep in parts,—in some places a little more. Mr. Penrose had asked whether window-glass had been found in connexion with Roman remains elsewhere in England. Yes: there were records of its having been found at Uriconium, and at one or two other places. Some of the fragments of window-glass found at Uriconium had mortar adhering to the outer edges, leading to the supposition that the glass was fixed into the window openings by means of mortar. Mr. Roach Smith, he should add, in a letter just written, stated that he had found window-glass in Roman remains at a great many places in England. As to the cause of the destruction of the buildings, there was, he thought, no doubt that they were pillaged after the Roman legion left the island, and were then destroyed by fire; for traces of fire were evident throughout, and many of the objects recovered were very much charred. The floors which were not covered with mosaic pavements were covered with a kind of fine concrete or plaster, but he could not say whether they had been decorated in colour. The plaster fillets round the walls were certainly coloured red, and splashed with black and other colours to resemble marble. One very curious point with regard to the glass, which had been analysed, was worth noting,—namely, that lead was wholly absent from it. The total dimensions of the buildings now uncovered were 200 ft. from north to south, and about the same distance from east to west.

The Chairman, in closing the discussion, said it might be expected, after receiving so interesting a communication as that which had been read, and especially as the meeting had the honour to be graced by the presence of so many ladies, that he should from that chair sum up the discussion. He should not attempt to do so, however, simply because any remarks emanating from him would be taken to represent the views of the body of the members. They as architects felt very great interest in discoveries of the kind described in the report, and they would endeavour, when the full facts were discovered,—as they could not be until the excavations were completed,—to pronounce upon the character of the buildings of which the remains had been described, and which buildings appeared to be only a fragment of a whole. It would be premature, with the comparatively limited discoveries which had been made, to attempt to pronounce definitely as to the uses and purposes of all the different apartments of which the remains had been found. It was better to take due time and care in arriving at conclusions. Many years ago now, when the first discoveries were made in Pompeii, there was issued one of the most charming books that had ever passed from the press. He alluded to Sir William Gell's work on Pompeii. Sir William was so fortunate as to be associated with a number of very eminent local antiquaries, and he was able, in the time he devoted to the preparation of his work, and by the care which he exercised in analysing the various discoveries from day to day, to propound theories and to indicate the uses to which the different apartments and buildings had been put. He believed that up to the present day the accuracy of the descriptions of Sir William Gell had never been challenged. Without attempting to compare the remains found at Brading with the imperial treasures found at Pompeii, he was bound to say that the character of the former seemed to be exceptionally important, regard being had to the size of the apartments and the character of the pavements and other objects disinterred. It was very probable, he thought, that further excavations would lead to infinitely greater results. It appeared to him that the work could not be in more diligent and careful hands than in those of the Messrs. Price, whom he assured that the Institute would receive with very great satisfaction any further facts that they might bring to light; and he hoped that when the matter was again discussed in that room, the members of the architectural profession would be in possession of sufficient data to enable them to speak authoritatively as to the plan and uses of the buildings. He concluded by formally moving a vote of thanks to Messrs. Price for their interesting communication.

This was carried by acclamation, and Mr. John E. Price having briefly responded, the proceedings terminated with the announcement that the next meeting would be held on Monday, January 3rd, 1881.

SPECIALISM IN THE BUILDING TRADE.

The tendency towards the acquisition of an exact knowledge of things, which is one of the prevailing characteristics of the present day, has already had the effect of altering the status and traditions not only of professions, but of trades as well. In the majority of employments, whether they embrace mental labour or handicraft, the ever-increasing call for division of labour has rendered specialism not only a prevailing feature of competition, but an almost necessary condition of success.

Whether or not this tendency is on the whole of advantage to the individual, as regards his power to grasp the general features of a problem connected with his particular profession, is a matter open to great doubt. Every now and then cases occur in which capitalists would be glad to have the advice and assistance of an "all-round man." Even in Medicine, where specialism may be looked upon as having to some extent found its level, and in which the divisions of labour are defined with considerable accuracy, there is often a difficulty on the part of a suffering layman as to whom he should

apply. The bodily organs are so interdependent upon each other that a specialist in derangements of one kind may possibly be found to treat his patient at the sacrifice of what the specialist in another department might consider to be essential to the recovery of health. It is not unfrequently one hears the remark,—"Ah! poor fellow, he went to the wrong man; if he had gone to so-and-so, he would, no doubt, have pulled him through." And this difficulty of whom to apply to is by no means confined to the profession of Medicine. We have already referred to the capitalist as being sometimes in a similar dilemma. Frequently the successful employment of money depends upon the solution of problems in which the judgment of a specialist is of little value. Cases occur in which investments that promised well at the outset are in imminent danger of missing the mark, on account of the unexpected appearance of difficulties that did not suggest themselves at the beginning. Hence, as in the case of men suffering from obscure ailments, it becomes necessary to inquire what kind of specialist should be employed, and often there is no answer to be obtained. Then it is that the "all-round man," who has been so nearly improved out of existence, is wanted, and cannot be discovered.

An engineer, like Smeaton, who could build a lighthouse or construct a windmill, would be a tolerably safe adviser in matters of engineering generally, but if he lived to-day he would have little chance of making a competence out of a reputation that embraced so wide a range of capacity. The occasions on which his advice would be paid for would be few and far between, unless he confined himself to some limited department of his profession, and his ability to advise his clients generally in matters requiring a strong grasp of the salient features of a difficulty would nowadays be scarcely a marketable commodity. Even if such another genius as George Stephenson were to arise amongst us, it would not be enough that he should confine himself to being a railway-engineer. We do not think we are far wrong in saying that if he were to choose the path that would bring him nowadays to the greatest amount of wealth, and even of reputation, it would be one that was narrowed to limits which were never even contemplated at the time he lived.

The consequence of an absence of any demand for the class of men of which Smeaton and George Stephenson were types, unless they consent to become specialists, has led very materially to a falling off in the supply. We know of cases in which the directors of great commercial enterprises have had to fall back upon the services of retired veterans who were trained under the broader system which is now practically extinct when they required the sort of advice which a specialist, by his very training, is frequently unable to give.

In the midst of all this general tendency towards specialism, which it is unnecessary to say is going on even more among trades than in professions, it is interesting to consider the case of one large industry which, in London at any rate, remains practically unaffected by it. We need hardly say that we refer to the building trade. As a short inquiry into the causes and conditions of this industrial anachronism cannot fail to be of interest to many of our readers, we make no apology for speaking of the matter at some little length.

Of course, we do not refer, in the remarks we are about to make, to those great contractors connected with the building trade who are in the habit of taking large contracts, and letting them out among specialists; nor to work in the hands of architects who insist upon its being subdivided among experts, as is invariably done in Scotland. It is the typical London builder of whom we wish to speak,—the man who calls himself a builder in the same way that a tailor or a bootmaker puts up his sign and looks for business, and yet who, unlike those tradesmen who stick to the specialty of cloth and leather, combines half a dozen trades in one by professing to overtake all the handicrafts that appertain to the construction of a dwelling-place. Viewed in this light, the builders we speak of may be looked upon as almost isolated examples of tradesmen who remain unaffected by the conditions which seem almost essential to success in every other industry we can think of. The men who build houses for the living are scarcely less affected by the prevailing system of division of labour, at least in London, than those who build houses for the dead. Masonry, bricklaying, plastering, painting, plumbing,—all are embraced under the superscription of a single signboard, and the advertisements in the newspapers from workmen in search of employment show how much the example of the masters has been followed by the men, and how important it is for a skilled tradesman to be what is known as a "handy man."

It is probably to this element of handiness that we owe the existence and continuance of the system. It is handy not only for the architect, but for the householder as well. As a rule, persons in London who wish to build a house fall in with the prevailing traditions of the building trade, and do not trouble themselves to consider the complexity of the appliances that are necessary in order to make it wholesome and comfortable. They do not think that it is necessary for them to have some guarantee that the different classes of work should be done by different classes of men. They do not notice that the system is directly opposed to the principles of specialism which have led to the perfecting and developing of other industries. The convenience of the prevailing method seems to cover its defects. It avoids trouble, and simplifies the business character of a building transaction. It concentrates the responsibilities of breach of contract or insufficiency of workmanship. It avoids the mutual recriminations of different tradesmen, and above all, it is the tradition of a highly conservative community.

In other parts of the country, notably in Scotland, division of labour has long been the rule, and not the exception. Nothing can strike the eye of a North British builder as a greater contrast between the system he has been accustomed to and the one prevalent in England than the simple record of one man's name in connexion with the construction of buildings in England. In Scotland one name would appear in connexion with the masonry, another with the plaster work, another with the painting, another with the plumber work, and so on. It is not, therefore, an unnatural question to ask, will the Scotch system, so consonant with the prevailing tendencies of the present day, spread to England, or will the present English system take root in Scotland?

As matters stand, there is much to be said on both sides. On the whole we believe it is generally admitted that the building in Scotland is superior to that in England. The system of land tenure, under which a man there builds for his remotest posterity without the fear of disturbance on the part of the superior, encourages the habit of constructing substantial houses. Saving in repairs is generally looked upon as more than a set-off against the additional outlay required for extra good workmanship and materials at the beginning. Moreover, there is a natural advantage over the great majority of building areas in England in the excellent quality and abundance of sandstone. Still, this does not by any means justify the supposition that there are not as good buildings in England as in Scotland, or that for one who is willing to give a good price, as thoroughly first-rate buildings cannot be had in London as elsewhere. We are rather inclined to go further, and say that the best workmanship in the world may be found in London. But having said this, we are by no means sure that we are justified in attributing the absence of specialism in the business of building contracts as the cause of the excellence referred to. We are inclined to think that in the majority of cases in which the credit of our national workmanship has been prominently maintained, the element of special contracts has prevailed; and we know very well how enormous is the amount of bad work done under the present mode.

Without going into the merits of the rival systems, it must be a subject of interest to many to inquire as to whether the plan at present in vogue in London is likely to last. Have the little Smeatons and George Stephensons of the building trade to continue, or are they to be swept away among the things of the past? Are people to continue to act with regard to their houses as their fathers were accustomed to do in matters affecting their health? Will they go on consulting the local builder about everything relating to their houses, from the drains to the gas-gipes, as the old-fashioned physician was consulted about everything connected with the ailments of his patients? or will specialism step in and change the aspect of the trade? Of the "handiness" of the present system there can be no manner of doubt. Even architects, whose business it is to know intimately the best method of doing every kind of work, are fain to confess to the great convenience of the prevailing system. The strange incongruities of a builder's yard have failed as yet to strike them as a great anachronism. Doubts have already been cast for some time on the advisability of being tempted to take the sign of a few pieces of wall-paper hung as a background to familiar sanitary appliances in the windows of the front shop as an indication that the general run of builders can be trusted in the matter of artistic decoration.

In this department a decided change has already taken place. The contrast between the work of specialists in the province of house decoration and the notions of men whose attention is divided among half a dozen trades at once is already too great to admit of comparison. But we do not quote this case in disparagement of the typical builder, but only as an indication of how matters are likely to go with him. The convenience to architects and to the average householder of the present state of the trade is evident enough. The training of a really good builder in London is not unlike that of an old-fashioned journeyman engineer, who could turn his hand to everything, and whose rapid disappearance is generally deplored; but it seems to us impossible that he can long retain his present position. On the one hand the art of the decorator has gone into the hands of specialists, and, on the other, some architects seem already inclined (unfortunately for architects) to divide their work with the sanitary engineer, who, on his side, is beginning to demand the services of workmen who have been specially trained. Already, then, a process of disintegration is setting in, and in spite of much that is to be said for the present system and for the abilities of the men who are connected with it, there is every prospect of its being replaced by another that is more consonant with modern tendencies. For a long time the change may not appear on the surface. Builders will probably continue to carry out the entire contract of house-building, even after they have been forced into subdividing the work among sub-contractors who are specialists. These specialists will no doubt sooner or later assert themselves, and just as we have come to have men celebrated in decoration, so, before long, we shall find other niches occupied by experts in the different branches of house-building, until perhaps before very long something approaching to the system in North Britain, and which formerly prevailed in England, has become almost universally prevalent.

THE PANAMA CANAL.

THE gigantic enterprise of M. de Lesseps, which seemed at one time a project impossible of realisation, is now actually taking form and position. Against every kind of moral and material difficulty, and through adverse opinion, M. de Lesseps has fought his way till the scheme of the Panama Canal is in train to become a *fait accompli*.

Before we come to the project itself, a few words about Panama from one who paid a short visit there may not be without interest, and serve to bring before the mind's eye a spot that will soon be the scene of one of the greatest engineering enterprises of any age or time.

"Twenty-four hours are more than enough," says this somewhat *blasé* traveller, "to know Panama. It is an indolent-looking spot, bathed by the waves of the Pacific, and yet seems by its geographical portion destined to become the *entrepôt* of the commerce of the two hemispheres. Breezes are rare, so rare that the legend runs, Pizarro tacked about for sixty-six days before gaining the open sea. However, that may have been partly the fault of the ships in those days. The little islands one can see from Panama have a pretty appearance. One of them, Taboga, produces pineapples of the finest sort; further off you see the Archipelago of Pearls, but, notwithstanding the name, at the present time, not more than two or three pearls of any value are found in a year.

Panama is an old Spanish town, but it has become so cosmopolitan that the ramparts and churches alone reveal its origin. Almost every one there can speak Spanish, English, and French. Many of the churches are falling in ruins, but they are picturesque, and the crumbling ramparts serve as a promenade, where, at the end of the day, one tries to get a

breath of fresh breezy air after the intense heat is over. Panama has neither park nor theatre, nor any particular gaieties going on in the town, as it is merely a passage; and the passengers hardly leave the grand hotel during the three or four days they spend there, though English travellers always meet with great hospitality from one of the chief families of the place, the Messrs. Hurtado, whose father was for many years Minister Plenipotentiary at the Court of St. James's."

The railway which unites Panama to Colon traverses a forest principally of brushwood. At some points the rails are literally on shifting and muddy ground, and travellers crossing these damp marshes often suffer from fever. The labour in laying down the rails was so excessive that, one morning, seven Chinamen, with that calm peculiar to the organisation of the children of the Celestial Empire, hanged themselves in company, on the same tree, sooner than continue their portion of the work. The railway-fare is very high, and the transit of merchandise ruinous. If once the canal is made through the isthmus, all this will change.

Colon (Aspinwall, Naos, Naox, or Limon, for it owns all these names) is built on marshes. Every house seems to possess a little swamp before it, just as we would have a garden. However, the American quarter, built near the sea-shore, is more salubrious, as it receives the breezes from the north. The railway-station is adorned with a good statue of Christopher Columbus, the only monument one can cite; for if Panama is only a large hotel, Colon is only a railway-station.

One can understand from this description how, when French and English travellers desirous of attaining the coast of the Pacific have reached Panama, they have anathematised that tongue of earth, not twenty leagues in width, which has forced them to go by South America: thus adding 3,500 leagues to their journey, and making it last three months longer, with all its added chances of disasters both to seamen and shipowners.

It was France who bestowed the first serious attention on this subject, in 1843, when Mr. Garella, chief enginer of mines, was sent to Panama. He proposed to open a canal from the port of Panama to the Gulf of Limon, capable of allowing a passage to the largest vessels. The difficulties the scheme of the Isthmus of Suez met with will make it understood that this idea met with but little support outside the engineering world; but the astonishing success of the communication between the Red Sea and the Mediterranean brought the subject once more prominently before the public.

M. de Lesseps asked for an international congress, under the auspices of the French Geographical Society. Five great committees considered the question under every aspect, and the statistical committee decided that a tonnage of 5,000,000 would clear the canal.

On the report of these committees the congress decided unanimously that an inter-oceanic canal ought to be made at Panama, between the Bay of Colon and the Gulf of Panama. That this canal, of which the length is to be about forty-six miles (the Suez Canal is more than twice as long) is to be constructed without locks, and exclusively fed by the sea. It is to be without any sensible rapidity, and at the constant level of the sea in the bay, where it is not affected by the influence of the tides. It is to be 72 ft. wide at the bottom, with about 27 ft. of water.

The canal would reduce the route from Havre to San Francisco to 3,300 leagues, whereas at the present moment it is actually 6,500 leagues.

From New York to Valparaiso the diminution in distance would be 2,700 leagues. It is actually 4,700 leagues between the United States and San Francisco. Six millions of tonnage, with a toll of 15 francs,—a figure which hardly equals the rate of the insurance paid by the ships that go round Cape Horn, whilst spending three months on a route that could be accomplished in two days,—would give an actual revenue of 90 millions of francs.

The duration of the works is fixed at eight years, and this term could be abridged if, instead of 9,000, there were to be 12,000 workmen employed,—an augmentation to be taken into consideration, as it might be in the interest of constructors and shareholders. The enterprise is to be confided to Messrs. Couvrent & Hersent, who accept it at the terms of 512 millions of francs (say 20½ millions sterling), though the total estimate seems to make the cost appear some 50 millions of francs more. Messrs. Couvrent & Hersent were the contractors for the Suez Canal, and they have been making fresh examinations, and have once more sounded, explored, and calculated. They affirm that 512 millions (francs) will suffice to dig out on a line of 73 kilomètres the 75 million cubic mètres of earth and rock from the bed of the canal, equalise the declivities and utilise the rubbish in the construction of a reservoir of a capaciousness of one milliard of cubic mètres, and which is destined to retain the waters of the Chagres, that rise considerably in the rainy season.

To be more precise still, let us add that a dam will be constructed between two neighbouring peaks, and hold captive the waters of the river which flow through a circuit of mountains admirably disposed to form the basin of a gigantic reservoir. The dam will be made at the foot of the bed of the Culæbra, so that the stone taken from the boring of the mountain will serve to construct the dam, which will be about 147 ft. in height.

There is much, also, to facilitate the ultimate success of the scheme in the fact that whereas at Suez there was the desert to conquer, at Panama there is water, a railway all along the line of the canal, ports, and steamboats, which touch in large numbers at the port of Colon. The head-quarters of the Canal will be on the Atlantic, and three lines of French steamboats will ply to Colon.

Such is the *ensemble* of the material elements. The financial may have some interest.

According to M. Levasseur, Member of the Institute and President of the Statistical Commission, the interoceanic transit would consist, almost immediately after the opening of the canal, of more than 7,000,000 of tons. Let us put it at what the company do, 6,000,000 tons. Lastly, it is hoped that the Panama Canal will be opened in 1886.

The capital (shares and bonds) is not to exceed the sum of 600,000,000 francs. A good dividend is guaranteed while the works are going on.

The Suez Canal shares, issued at 20*l.*, are now worth 52*l.* However, it is as a great engineering work, not as a financial scheme, that we again draw attention to it.

A LINK TO JAMES BARRY.

The cleansing of Barry's remarkable works in the great room of the Society of Arts, the observations upon them in our own pages, and a recent eloquent lecture, have brought him forcibly into notice. Turning over one of our early volumes just now (the fifth), we lighted upon a paragraph which reminded us of more than one conversation we had had, in our early days, with one who had known him well, and dwelt fondly on his memory, and this was Elizabeth Cockings, a servant in the house when Barry was painting his pictures, and subsequently the Society's housekeeper, a post she retained up to the time of her death. According to her story, which we then recorded,* Barry often lived on bread alone; all his friends, with the exception of Edmund Burke, had given him up, but in the eyes of Elizabeth he was ever a hero. There was James Barry—the stern, solitary, eccentric, and the then childish, playful girl of eighteen, who, as we gathered from her own statements to us, gazed complacently at these remarkable images, as they grew out of the mute canvas; and Barry may have painted some of his capricious female figures to astonish his young friend. She had many anecdotes showing the bent of his mind. A certain lord had lent him some costly work for reference, and as the artist had kept it some time, the owner wrote him a friendly letter, presenting him with the book. This (poor, undiplomatic) Barry repulsed as a downright insult! What was to be done with a man with such feelings in a commercial and higgling age? Then he would shut himself up in his cheerless cold room, brooding over his own reflections, and then again darting forth and creating images which are becoming understood. When, by such behaviour, he baffled all his friends, none could approach him, save Elizabeth. Then she would take him his meals, deliver messages, and make his room as comfortable as his strict (and religiously observed) orders would permit it to be. And then she had to bear his death, and the neglect of his memory which followed. Years rolled on. There were the paintings, though few looked at them. But time is a great justifier And then came Canova, and gazed long and intensely on the Apotheosis of man's history. This consoled Elizabeth's heart, who remained single all her life, living on the memory of a baseless dream.

* See vol. v., p. 59.

NEW RUSSIAN CHURCH, DRESDEN.

The new Russian church, erected at the end of the Reichsstrasse at Dresden, is from designs of the architect Harald Julius von Bosse, of St. Petersburg, who has given to Dresden an addition to the series of remarkable buildngs within her walls. The comparatively large number of Russians of the Greek faith residing in the pleasant capital of the kingdom of Saxony have long felt the want of a church of their own, and when, a few years ago, a movement was set on foot for erecting a Russian church or chapel, the project met at once with such liberal support that its realisation was not long delayed. The new temple has been raised entirely by private subscriptions. A wealthy Russian-German, Alexander Wollner, at once presented a site; other Russian residents contributed handsome sums, the subscription list being headed by the Russian councillor, Simeon von Wikerlin, residing in Dresden, who gave 21,750*l.* of the 24,750*l.* required for the erection. The plan of the church follows closely that of Russian churches of the most flourishing period of the Russo-Greek ecclesiastical style of architecture, as expressed in the finest churches of Moscow and Kieff. The church is not large, for it holds, in accordance with the limited requirements of its small congregation, only about 300 persons. It creates, placed among surroundings of entirely different styles, a novel impression, with its towers and turrets, its bulbiform domelets, its shield-like gable-ends. The inner embellishment of the church by statuary, paintings, and general ornamentation has been effected by Karl Weissbach, James Marshall, Becher, and other artists.

DECORATIVE SUGGESTIONS FROM NATURAL FORMS.—No. 8.

The suggestion for a pavement given in our present number speaks for itself, and needs no comment.

COMPETITION: NEW SCHOOL OF ART, LIVERPOOL.

The Board of Directors have awarded the first premium of 100 guineas to the design marked "Fides," by Mr. Thomas Cook, of Liverpool, and the second premium of 25*l.* to the design marked "Let there be Light," by Mr. C. O. Ellison, of Liverpool. The directors have decided not to exhibit the designs submitted to them. In Mr. Cook's design, the entrance vestibule, 11 ft. wide, is placed in the centre of the front to Mount-street. On the ground-floor the accommodation comprises two elementary rooms, architectural, modelling, store, and attendants' rooms, also male and female lavatories and cloak-room; and on first-floor, two antique rooms, painting, life-class, and head-master's rooms. The building is designed in the Queen Anne style, and is proposed to be faced with Hollington stone, the estimated cost being 10,600*l.**

Alleged Building Society Frauds.—Warrants were issued by the stipendiary magistrate at Swansea, on the 10th, for the apprehension of the late treasurer and the secretary of the Second Swansea Equitable Benefit Building Society. Information was sworn by the chairman, accountant, and directors, to the effect that the society was formed in 1872, and was conducted almost entirely by the accused, who acted also for the First Equitable Society. The bookkeeping was a sham, but there was evidence of fraud in money and deeds, and the deficiency in both societies was about 12,000*l.* William Henry Jones, the secretary, is chief accountant in the borough treasurer's office, and also deacon of a Calvinistic Methodist chapel. He was apprehended, and subsequently admitted to bail in 400*l.* Herbert Jones, the treasurer, who was a bookseller in the town, has been unable to find bail.

* "Competitor" writes as to "rumours" of improper proceedings in this competition. There should be something more precise than rumours before charges are made.

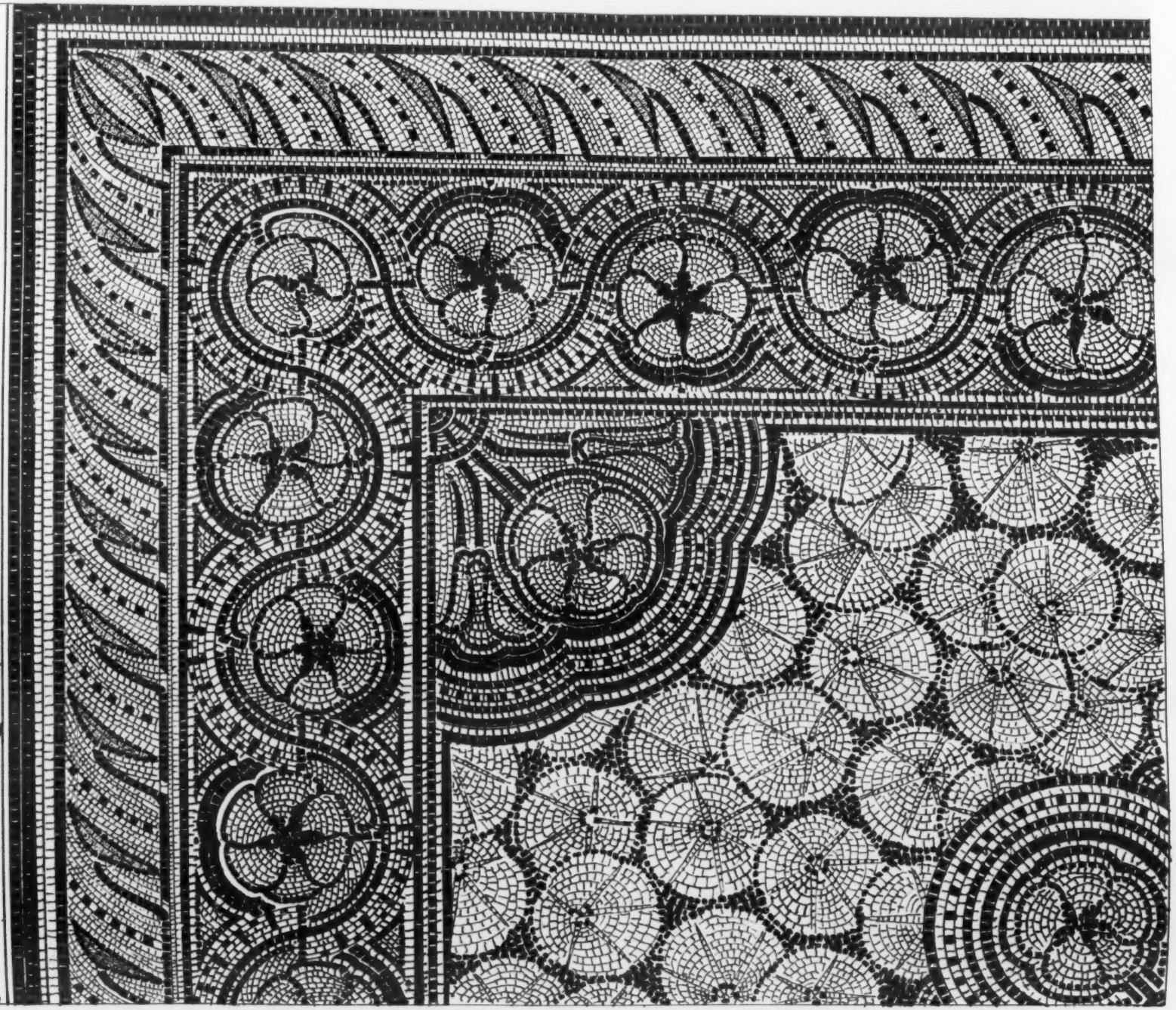
THE NEW RUSSIAN CHURCH AT DRESDEN.—Harald Julius von Bosse, St. Petersburg, Architect.

VIII.

NASTURTIUM.

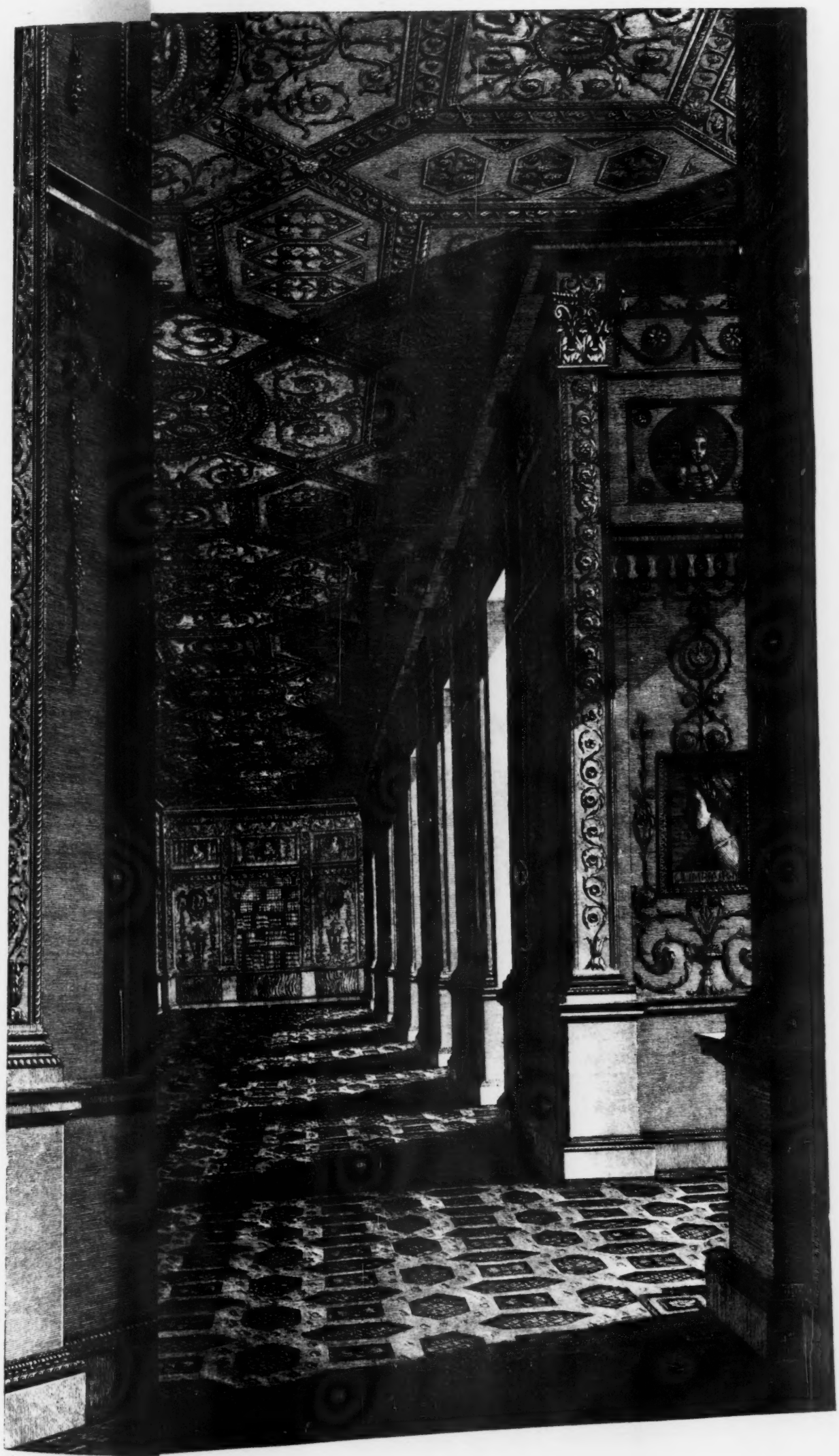
[APPLIED TO MOSAIC.]

H. H. STATHAM.



Wyman & Sons, Printers, 74 Queen St.

DECORATIVE SUGGESTIONS FROM NATURAL FORMS. — No. 8.



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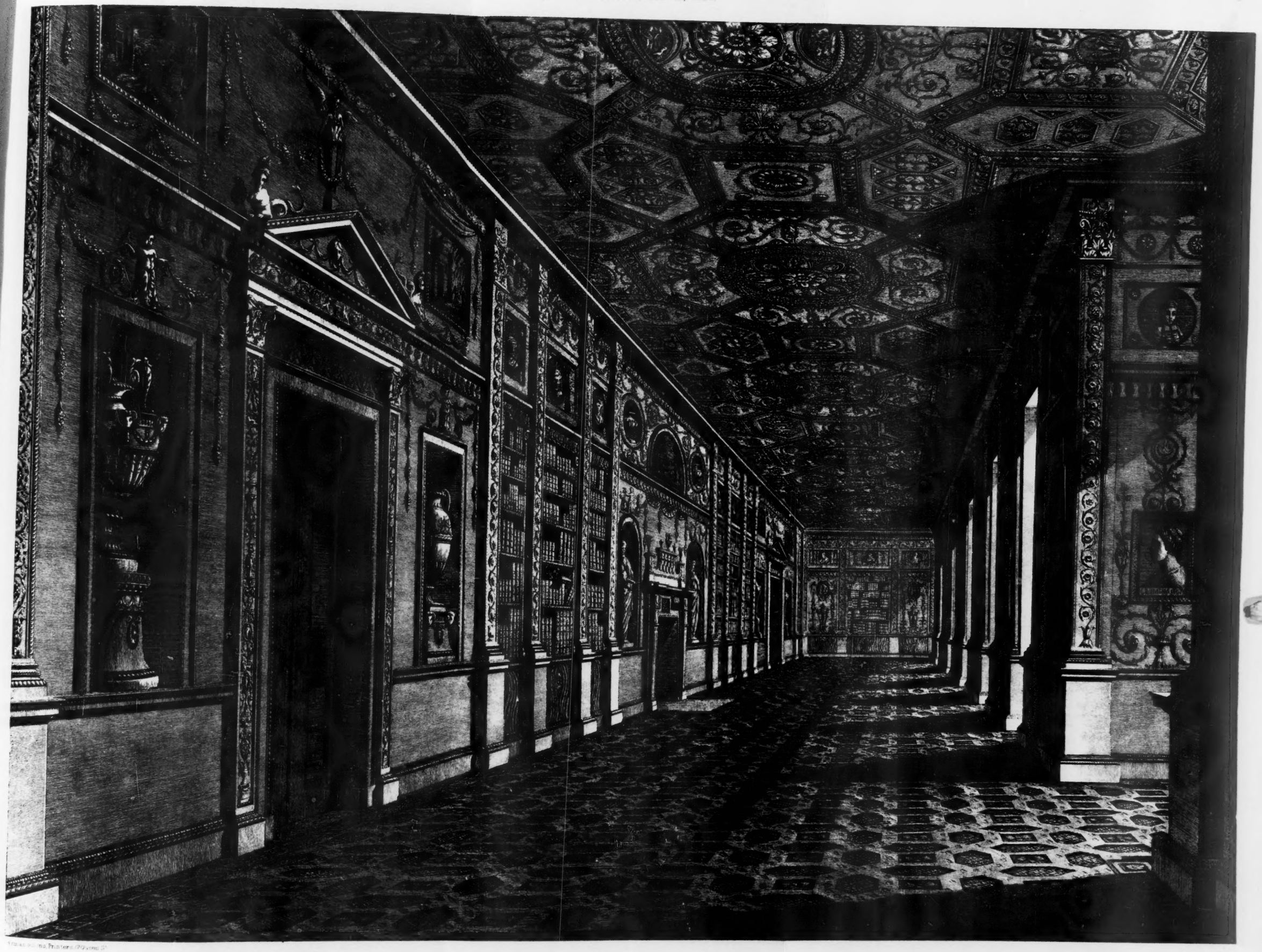
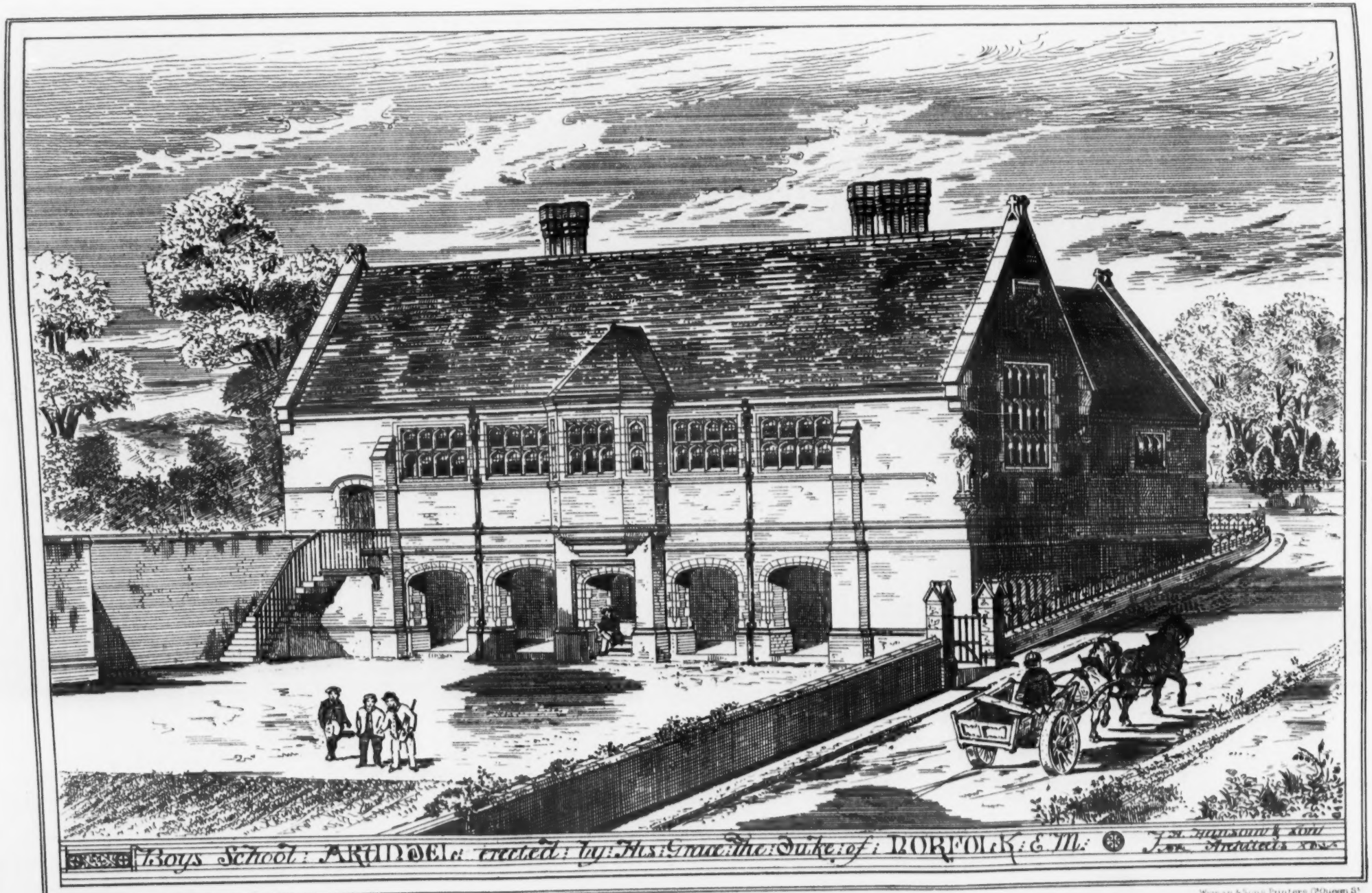
—Robert & James Adam, Architects.



VIEW OF THE LIBRARY IN SION HOUSE, SEAT OF THE DUKE OF NORTHUMBERLAND.—ROBERT & JAMES ADAM, ARCHITECTS.

THE BULLETIN DEC 18 1888



Whiteman & Bass *Photo-Litho*, 236, High Holborn

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DECORATIVE WORK OF THE BROTHERS ADAM.

MR. BATSFORD knows which way the wind blows, and prepares for a *sale* accordingly; he sees that some of his customers are on the eve of going back to Adam, so calls in the aid of photography to supply them cheaply with materials for their journey. In plainer words, he has issued, under the title, "The Architecture, Decoration, and Furniture of Robert and James Adam, Architects," * a selection of twenty-six folio plates taken from their well-known but now scarce book, "Works in Architecture," published between 1778 and 1822. The new book includes a number of ceilings, chimneypieces, fittings, and pieces of furniture, besides views of two of the drawing-rooms in Earl Derby's house, Grosvenor-square; the library at Kenwood, residence of Lord Mansfield; the library in Sion House, the seat of the Duke of Northumberland; and other apartments. We are enabled to reproduce the view of the library in Sion House, which will serve as a specimen of the work and show how well it is done. It was a lucky thought, considering the temper of the times, and we have no doubt the publisher's enterprise will find a reward. We add a few brief notes as to the authors.

Robert Adam, who was the leading spirit of the firm, was born either in Kirkcaldy or Edinburgh, in 1728, and his father, if not an architect, designed two or three large buildings in Scotland. Robert went abroad to study; and, while his contemporaries, Jas. Stuart and Nicholas Revett, were measuring remains in Athens, Adam was measuring and drawing the now well-known and much-abused Palace of Diocletian at Spalatro, in Dalmatia, where he found the seeds of the style he afterwards produced. When settled in London, and in partnership with his brother, he executed a large number of buildings, public and private, some of which we have already named. Portland-place, Stratford-place, Hamilton-place, two sides of Fitzroy-square, and the buildings of the Adelphi, are also among their works, some of which, especially the last-named, were executed by them as speculative builders, and were not financially successful. We have no great admiration for their designs, but they were at any rate artists, had a distinctive style of their own, and certainly improved on the street architecture of their day. Robert Adam was at one time architect to the king, but gave up the appointment after a few years in order to go into Parliament, where he sat for the county of Kinross. He died in 1792 and left behind him the sweet savour of a kindly heart and high moral character. The brother died two years afterwards.

The selection made by Mr. Batsford is a very good one, and the original engravings are marvellously well reproduced.

* London: B. T. Batsford, 52, High Holborn.

NEW BOYS' SCHOOL, ARUNDEL.

WE give this week an illustration of the above building, showing the back elevation and the covered playground underneath the school. In February last we gave an account of this building, and subsequently a view taken from the front in the London-road; it will, therefore, be unnecessary to recapitulate these particulars. The school was opened last Whitsuntide. The entire cost was defrayed by the Duke of Norfolk, Mr. Claridge, of Banbury, being the contractor; Mr. Heveningham, of Arundel, the clerk of works; and Messrs. J. A. Hansom & Son, of South Kensington, the architects.

The New Seed-Crushing Mills and Oil Refinery on the Boat Quay, King's Lynn, belonging to Messrs. Walker & Son, have just been opened, in addition to their Albert Oil Mills, by the side of the Dock. The buildings cover an area of nearly 4,000 square yards, and are fitted up with the newest and best-known machinery extant. The quantity of cake produced at Messrs. Walker's two mills amounts to 800 tons per week, with 200 tons of refined oil. The oil-mill machinery has been supplied by Witham & Sons, of Leeds (and is upon what is known as the Anglo-American system), and the engines are by Simpson & Co., of London. The buildings have been erected by Mr. W. H. Brown, of Lynn, from plans and under the superintendence of Messrs. Adams & Son, architects, of King's Lynn and Wisbech.

DWELLING-HOUSES: THEIR SITUATION AND CONSTRUCTION.*

THE PARKES MUSEUM OF HYGIENE.

IN addressing you to-day upon the opening of a course of practical lectures on house building and situation, it is both my duty and pleasure to remind you of the provocative cause,—of the collection of interesting objects that form this museum.

The Parkes Museum of Hygiene is the result of a strong desire on the part of both the professional and personal friends of the late Dr. Parkes to found a memorial of such a character as to aid scientific investigation and practical study in the subject to which Dr. Parkes's life and work had been specially devoted. In determining what the museum should contain, the committee state in their first report that "They tried to limit their endeavours mainly to an attempt to illustrate, *visually*, the various subjects which are treated of in Dr. Parkes's comparative book on practical hygiene."

The articles exhibited are arranged in six groups, under the following headings, viz.:—

1. Engineering and local hygiene; 2. Architecture; 3. Furnishing; 4. Clothing; 5. Food; 6. Preservation and Relief; and, lastly, a library containing the most recent works on sanitary science.

You are all aware of the circumstances which have led the committee to inaugurate the course of lectures to members of building societies which I have the honour and pleasure to commence, with some remarks on the choice of a site for a house, and on the materials and general construction which should be employed to render any house not only commodious, but healthful.

The space in which the present museum is accommodated is, however, very limited, and I propose, therefore, in the first instance, to make some general remarks before I lead you to the objects themselves, so far as this institution supplies examples.

Dr. Corfield, who will address you on a future occasion, has already published a most useful and interesting little book, entitled "Dwelling Houses: their Sanitary Construction and Arrangement," and I should recommend any one desirous of possessing a better acquaintance with the subject than he is likely to carry away in his memory from anything I may say, to purchase that little book, which comprises a series of lectures commonly termed the "Cantor" Lectures, which were delivered by him before the Society of Arts, and which lectures were largely illustrated by specimens borrowed from this museum.

And now as to our subject.

SITUATION.

By "situation" I mean to imply that it is quite possible to have an excellent house, and yet to have an unhealthy dwelling, if care has not been taken in the choice of its site. And in choosing a site I take it for granted that your choice is comparatively limited, and that I am addressing those who do not contemplate living in the midst of a beautiful park, but whose business necessitates their living within a city, or in its near neighbourhood, or within easy access thereto.

1. *Aspect.*—The value of land in the suburbs of any great city limits the choice of aspect. The streets are usually arranged in such a manner that the most may be made of the ground, and in the selection of your site, or of your house if it is already built, be careful to see that the road runs pretty nearly north and south, so that your house may have its principal windows and doors facing east and west, and the street in front of you and the garden at the back of you will always partake of whatever southern sun our ungracious climate vouchsafes. If you select a corner site, you will have three sides of your house exposed to the wind and weather; take care to choose the southern corner, and you will save much fuel in the preservation of sufficient warmth within. The thin walls of small houses allow the wind to pass clean through them at the rate of several cubic feet per hour. In the large detached houses it is usual to arrange the living-rooms on the south, east, and west sides, and the kitchen offices towards the north, with a shrubbery beyond and around to screen the offices; the larder and dairy always to face north, and the wine-cellar to be an internal chamber, to preserve an equable temperature throughout the year.

2. *Soil.*—The nature of the subsoil, or the stratification of the earth upon which the building stands, is the next important inquiry, but not second in importance. A damp site makes a damp house, not only by the surface dampness of the surrounding ground, but by the ground air which forces the moisture under and into the house, drawn forward by the means adopted for warming the interior, which, by lightening the weight of the internal air, makes a free passage for the damp ground air in the direction of the least resistance. There are two general divisions in classifying soils, the permeable and the impermeable; and in proportion as the site is free from moisture, in the same proportion is it fitter for residential occupation. But it does not follow that impermeable soils are the driest; on the contrary, it is usually the permeable.

Pervious soils are those like gravel, sand, and soft limestone, which allow of the free passage of water through them, and if there is nothing to obstruct its free passage, and the level of the water in the ground is sufficiently deep, the upper surface upon which the house is built is always dry and healthy. If, however, the gravel has no deep outlet for water which passes into it, owing to its being situated in a basin of impervious soil, so that the level of the water in the soil is brought very near the surface, then it is necessary to find an outlet for the accumulated water by artificial means, called land drainage.

Impervious Soils are those chiefly composed of the various clays, which do not allow the water to sink into their depths, but only suffer it to flow over their surface, and consequently the garden soil gets super-saturated; and if the land is level, the water is long in getting away, and the evaporation of the moisture in and upon the soil produces a humid damp atmosphere, very injurious to health, and requiring very careful surface-drainage to overcome.

The public roads, forecourts, and areas of houses in a town are usually so well drained that no evil comes from this source, as a rule, in front of the houses; but the back gardens are commonly neglected, and the basements suffer in proportion. It is obviously important to you as investors in house property, for income or for residential purposes, to look to the surface and subsoil drainage of the site of the house you buy or build, as the case may be. But this is not all. Suburban villas are not always built on natural soils. The brickmaker has sometimes preceded the builder on impervious soils, and the gravel and sand merchant has sometimes sunk great gravel-pits for the sale of gravel and sand, on pervious soils. And to bring the land to its uniform level, the well-known notice-board has been put up, inscribed "Rubbish may be shot here," which is only another phrase for "The Seeds of Disease sown here." Avoid such sites altogether. I could point you to many, but common sense is shocked at the folly,—shall I say the wickedness?—of raising human dwellings over such abominable deposits. Happily the Public Health Acts all over the country are gradually influencing the age; and the action of the Nuisances Removal Acts, Local Management and Building Acts, are all aiding the public in the acquisition of sounder and healthier dwellings. Instead of grudging the fees paid to district surveyors and local officers, it would be wiser to secure their influence and direction, and to support their authority.

CONSTRUCTION.

Having secured a fairly healthful site, let us next consider how to make the best use of it.

1. *Foundations.*—You will not often have the opportunity of building your house upon a rock, but let us see that it is not built on the sand, or, what is equivalent to it, upon soft loamy soil. Hard gravel or chalk is an excellent foundation, but usually the soil is treacherous, and if there is any doubt about it, do not spare a few yards of good concrete formed of one of ground-stone lime and six of good clean ballast, or hard-burnt clay broken up to pass through a ring 2 in. diameter. If there is water in the soil, use Portland cement instead of lime, in either case to be thrown into the trench from a height of, say, 6 ft. The concrete to be of sufficient thickness, not less than 12 in. thick for any wall, and usually 2 ft. thick; but it is rarely necessary to exceed 3 ft. in thickness; and always make the trenches 12 in. wider than the lowermost footings of the wall. Do not raise your

* By Mr. Edward C. Robins. The first of a course of lectures to members of building societies, delivered on Saturday, the 11th inst.

concrete above the level of the top of the trench, but fill in your trench with concrete, and form a layer of concrete from 4 in. to 6 in. thick over the whole surface of the basement, to keep back the ground-air and the moisture it brings with it. And a similar layer of concrete to be put under all paving external to the walls of the house. Bed the soil-drains in concrete to a fall of not less than 3 in. in 10 ft., and as much more as possible. The footings of all walls should be in single courses, and each should project 2½ in.; the lowermost footing should be twice the width of the wall resting upon the footings. The bricks used for the foundations should be sound, hard-burnt, grey stock bricks, or others equally hard, or harder, and the joints should be filled up solid with the mortar or cement used.

Damp Course. — Just above the level of the lowest floor of the house two courses of brickwork should be built in cement, and between them should be laid a double course of slates in cement, or a layer of asphalte not less than ¾ in. in thickness, as a damp course to prevent damp rising by capillary attraction in the walls themselves.

We will look at some of the contrivances in the museum for making damp courses of stoneware, and of utilising them as air-bricks for passing air from without to the spaces sometimes left under basement floors, and always required under joisted floors so as to give free access for the air to permeate every part of the space, which should never be less than 12 in. from the surface of the ground or concrete layer, to the underside of the joists of the floor over. Dry-rot will never appear where there is a free circulation of air; where it has appeared, it may be arrested by the introduction of a sufficient quantity of moving fresh air.

2. *Walls.*—The enclosing walls, of solid brickwork, of a building to be lived in, ought never to be less than 14 in., or a brick and a half, thick, though the Building Act allows them to be 9 in., or one brick thick for certain heights and lengths, and certain stories defined in the schedules appended to it. But a much drier wall would result from walls of the same thickness, but built hollow, and united by galvanised iron ties, one in every square yard. Walls built of cement concrete are both strong and dry. The materials used in the construction of walls are various, and thickness is not the only thing required.

Mr. Lascelles has constructed cottages with walls 1½ in. thick, and quite impervious to moisture, but then they are formed of hydraulic cement concrete slabs as hard as nether millstones, and not so porous. But bricks will always be most in requisition for house building in this country, except in the stone districts, where more or less porous freestone will be used for those parts that require to be worked with a tool, and the hard flinty rubble stones will depend chiefly on the imperviousness of the cementitious matter in which they are bedded for their soundness and resistance to the weather. The porousness of soft building stones may be overcome by various chemical solutions. The Indestructible Paint Company have provided one, two coats of which applied by a brush when the stone is dry will stop the pores and cause water to pass off it as water from a duck's back. I never use Bath stone externally without applying this solution.

With reference to bricks, it is all-important that they should be well burnt; the half-burnt bricks are not only very porous, but crumble away the first winter; they are called place bricks. Rubbers, or bricks required to be soft enough to cut to mouldings, or for gauged arches over openings, are necessarily pervious.

White gault bricks, wire-cut or pressed, make good face bricks, and the "pinks," as they are termed, are best to back them with, because they are of equal size. It is bad to face with a thick brick, and to back it with a thin brick, as it is obvious that the mortar joints in the one case must be thicker than the other, and cause unequal settlement. A quarter of an inch is as wide a joint as is desirable.

Red bricks are usually more porous than others; but there are good hard red bricks to be had.

Glazed bricks are very costly; but Candy's granite bricks from Chudleigh, in Devonshire, are like flint, and to be put into trucks for 37s. 6d.

The blue Staffordshire are like iron, and are commonly used for copings and curbs to railway platforms and kindred purposes.

All brick copings should be set in cement, with a double tile creasing projecting to throw the water off the wall.

It is an important axiom in building to put "voids over voids": it is the best construction, because it involves putting solids over solids, and so produces equality of settlement. It is economical, too; for if a solid wall comes over a bay-window, the chances are that the bressumer will be overweighted if no architect has been employed, and if it is not, the cost of the bressumer will be increased by the additional strength required to carry a wall where a window should have been; yet how common it is to see two windows on the upper floors situated wide apart, and a bay-window on the ground-floor, just under the pier between the upper windows.

The superincumbent brickwork over every opening should be sustained by discharging arches which should pitch on the brickwork, and not on the wooden lintel beneath it, which is placed there to fix the door and window frames, and to carry the filling-in between the arch and the lintel. *Rough lintels* of artificial stone, for use in place of timber for door and window openings, introduced by the late Matthew Allen, now made by Lascelles, are much in use by architects.

When openings are wide it is usual to distribute the weight of the piers upon the foundations between by means of invert arches. But what most disfigures buildings is the bad construction of the arches over the openings, more especially where they are covered with cement architraves and cornices; being out of sight, they are not formed as arches at all, but hold together by the tenacity of the cement only. It is better to employ half-brick rings, one over another as required, than to make false flat arches, and put false joints to make believe.

Mortar.—In the matter of mortar, it is needful to add a word of caution. Much of it is not mortar at all,—that is, lime and sand in the proportion of one of lime to two of river sand. The lime is of inferior quality, and in small quantity, and it is often mixed with loam, or street sweepings, or the *detritus* from sludge brought up from the main sewers, and sold at 6d. a yard to Jerry builders. Houses compacted together with materials so mixed,—full of impurities, such as decomposed or decomposing animal or vegetable matters,—cannot be healthy, and the smell that often comes from plaster with which interior walls are lined may be traced to this source. I have used at the Choir Schools of St. Andrew's, Wells-street, and elsewhere, selenitic mortar for the brickwork and for the plastering. It is a valuable substitute for the ordinary mortar and plaster, at nearly the same cost, and it sets hard like cement. Care must be taken in the mixing, or it blows in the setting, or sets with a curious array of pinholes.

Chimneys.—In the construction of chimney-breasts, it is often the case that the breasts are not built up solid, but have large cavities left, and the flues are built on no principle, with wide and open jaws below and a small pot above. It is desirable that the flues should be as straight as possible, for the sake of preserving a good draught upward; but it is often important to prevent down-draught by sloping a portion of its length, with a seat for the air to beat against to break its descending force. All flues should be quickly gathered over the mouth of the fireplace, and should be lined with plaster, or be formed with terra cotta, though the use of the latter, by giving too little hold for the soot, occasions its unexpected fall at inconvenient seasons. All hearths in upper floors should be supported on half-brick trimmer arches in cement, but sometimes these are omitted, and the centreing for the arch is lathed for plastering, and the stone hearths rest on the timbers of the floor. The arch, though butting against the trimmer, should have a deep skewback in the wall, so that if the trimmer were removed, the arch would stand alone when set. All trimmer joists should be at least ½ in. thicker than other joists. But besides solid or hollow walls of brick and stone, and cement-concrete walls of various kinds and thicknesses, there are other forms of enclosure which are to be commended as combining picturesque effect with weather-proof construction, and with a minimum thickness and weight of material. I allude to what is called half-timbered work. Of old, the upper stories of buildings were rarely built of such solid materials as the ground story; but stout angle-posts, filled in between with more or less substantial intermediate posts, called quarters, let into a plate below, and head and sill above, with intermediate braces, were all well knit together with oak or iron pins; and these timbers were, and still are, usually filled in with half brickwork, and rendered in lime and hair both inside and out: the inside was finished with fine plaster face for colour, paint, or paper, while the outside was either finished in rough cast plaster with pebble face, or was filleted with battens, and covered with vertical tiling of plain or ornamental design, well secured to the battens with two galvanised rails. The tile battens may be put on either before or after the plaster rendering. For sound-proof flooring and partitioning, and for a frost-proof covering to cisterns and pipes, nothing is better than slag felt.

The tiles used should be well burnt; pale red coloured tiles, like pale bricks, are but half-burnt, and are porous; but rich warm colours, with a bloom, are well burnt, and of indestructible durability. Such tiles used for covering roofs are at once the warmest of coverings in winter and the coolest in summer. Speaking of tiling and tile-work generally, great improvements have been made in ridging tiles. Cooper of Maidenhead, and others, produce very perfect work, and there is no better ridging than saddle-back tiles well set in lime and hair, carefully pointed in cement. The cresting, if any, should not be a separate part of the ridge fitted into a groove; it is better that the tile should be complete in one piece, with handsome hip-knots and finials finishing, also moulded in one piece. The simplest outlines are best. No pavement is better than the best Staffordshire red, black, and buff paving-tiles, and none are cheaper except Portland cement mixed (half and half). They should always be laid in concrete, worked to a smooth face to receive the tiles, bedded in mortar and pointed in cement, and if they are laid anglewise to set patterns the commonest floor is made interesting. The more beautiful colours and quality, delicate texture, and beauty of design, which distinguish Minton's, and Maw & Co.'s tiles, must be paid for if desired.

Floors. — But tiles, like stone and asphalte, both of which are valuable in their place for paving, are oftentimes too cold for the feet, for internal use, and wooden floors are preferred. To get a wooden floor, and yet one as solid as either of the rest, it is necessary to substitute 1½ in. to 2 in. thick wood blocks, about 6 in. long and 3 in. broad. These blocks, set to a herring-bone or other pattern, should be Burnettised to prevent dry-rot, and may be bedded in gauged lime-and-hair mortar, and the interstices filled in with Portland cement powder; then sweep the surface clean, and wash it down with water, which, setting the cement in the joints, makes a permanent floor, which may be polished. They are sometimes laid in asphalte, and are of various sizes. I exhibit a specimen of this kind of solid wood-block floor, sent by the manufacturer, Mr. Gregory, of Station Works, Clapham Junction. Mr. William White, an architect, was the inventor of this, which I believe to be the best kind of flooring for basements. You will observe that these blocks are dipped in pitch before laying, which is a further improvement. As the surveyor of the Berners Estate, Oxford-street, where I have some 600 houses under my care, I have had very great opportunities of observing the relative durability of houses, and my experience has taught me that the exclusion of moisture is the secret of perpetuity, as it is also the most important element in healthfulness.

Damp soils, damp walls, damp roofs,—these are the causes of premature decay. The area pavings allowed to be laid on the ground instead of on concrete, or bedded in mortar, perhaps, but not pointed in cement, the wet gets through and saturates the foundations, which may be built of absorbent bricks, and have (as the walls of old houses often have not) no footings, and, what is more common still, no concrete, but baulks of timber laid under them, which, rotting by the alternate wet and dry state to which they are subjected, their decay is revealed by the settlements which appear in the walls, which walls, having no damp course, have become by the attraction of the warmer air in the house, and what is called capillary attraction, saturated with damp several feet above the floor, which, if of wood, will in all probability have no space under the joists and no air-bricks in the outer walls to ventilate the same. The walls may be lined inside and out with plaster or cement badly made at the first, and receiving the moisture like a sponge, which is absorbed by

the bricks as it is forced through the walls by the winds or differences in the temperature of the air. But the walls may not be cemented or stuccoed on the outside, the bricks may be exposed, and the badly-burnt ones will scale off in flakes as the frost affects them; and even if the facing-bricks are good, the joints are defective, and the original pointing has fallen out, and where renewed, has been done without first well raking out the old decayed mortar, and so there was no hold for the new pointing, and it may be picked out with the finger, and is ready to fall at any time, the result of which is that the wall has admitted the damp to such an extent that the walls have bulged and twisted and become detached from the cross or party walls and finally fallen into the street,—as the fronts of three houses in Newman-street, Oxford-street, did about ten years ago.

Then there is the roof: the parapets and chimney-stacks are crumbling to pieces and out of the perpendicular, and the owner would probably as soon think of pointing the joints of walls that could not be seen from the street as to wash his own body because it was hidden by his clothes. The continued neglect of such things brings its own punishment in the bill for dilapidations which comes with the termination of the lease, if not before.

But to return to the roof. It may once have been well tiled, or slated, or covered with lead, but it has been improperly repaired; and zinc has been substituted for lead internal gutters and iron external or eaves gutters, and cement filletings for lead flashings to walls and chimney-stacks. The zinc has decayed, never having been laid with proper fall or with proper rolls or 2 in. drips to shorten the length of the sheets used; but the sheets have been soldered to one another and the changes of temperature have twisted, and buckled, and torn the gutters and flats, which, if made of zinc at all, should have had free scope to shrink or swell, being put together by a system of overlapping joints, no solder or other immovable fastening being used at all: then the zinc is so thin, No. 12 instead of No. 15 being used as a rule. Use galvanised or Barffed iron in preference to plain cast or wrought iron, which will prevent corrosion, whether painted or not. Then the timbers of the roof have been much too slight and not properly braced together; the rafters have neither collar to cross-tie them, nor purlins to shorten their bearing, or these are too slight, or too far apart, and the roof sags, and the cement filleting, if it has not rotted, has become detached from the wall or the slates or both, and the damp trickles down inside, and the walls and ceilings attest the defective state of the roof, and its consequences.

Now, good construction in building houses is not to be understood without taking the pains to understand it, and the majority of Jerry builders, as they are called, make it a chief part of their business to learn how *not* to do it. And thus you see that the province of the architect is not to be despised. He it is who stands between the owner and the builder and arbitrates between them. He it is who not only designs the pretty façade archæologically correct in whatever style of architecture the fancy of his employer may desire, but he it is who writes the specification, describing every part of the building, determining every kind of material or sanitary appliance to be used, specifying everything of the strength required for its purpose and no more. He it is who brings his scientific as well as his technical knowledge to bear upon the attainment of the largest result for the least money compatible with sound construction and good sanitation. And not only is he all this, but he also takes upon himself the responsibility of seeing that his instructions are carried out by the builder employed, whether that builder is the lowest in a large competition of builders, or a person whom both employer and architect know to be a trustworthy tradesman, who knows his business and is willing to do it at reasonable prices. Such men are rarer than they ought to be, but honesty is the best policy, and an architect who has reason to know his man and to trust him fully can make the fortune of any such person, and prevent the necessity of his stretching his conscience to do things which his poverty and not his will consents to.

There are lots of young educated architects anxious to make their way in the world to whom the smallest opportunity of distinguishing themselves is a pleasure. Such men are ready and willing to give their services with the earnestness of men of their class for the poor pittance of 5 per cent. on the cost of the building. Why deprive yourselves of the assistance of such men to save a penny and to spend a pound you know not how? Why not have the help of intelligent men, whose interest it is to get the work done in the best possible manner, as the best means of gaining the reputation which will ensure their future success as architects?

The mass of the buildings in London are not built by architects at all, and yet we often hear them blamed as if they were responsible for the miles of miserable dwellings with which this great city abounds.

I have spoken chiefly of what concerns the exterior fabric of a building, because keeping the weather out is easier than contrivances for overcoming the consequences of its having already got in. And in this connexion I ought to have mentioned the advantages derivable from the use of terra-cotta, instead of stone or cement, or even brick, dressings and cornices, &c. Good terra-cotta is comparatively indestructible, and if a pattern is given which is repeatable, it is cheaper than any other materials. If moulded bricks are used, let them be moulded and not rubbed if you wish them to last and keep the weather out. I need scarcely say that brick drains are now entirely exploded, and stoneware socket drains are everywhere substituted for house-drains. No soil-drain should be more than 6 in. in diameter or less than 4 in; 5 in. would be better than either. They should be set in puddled clay, and pointed in Portland cement, and laid in concrete. So far as they may have to pass under any part of the house, they should be perfectly straight, with openings at the back and front of the house for examination and cleansing. Every soil-drain should be ventilated before it is connected with the sewer, on the house side of the sewer. This cannot be too often repeated.

And now a very few words on the interior. Good joiner's work is the test of a good builder, some say; certainly, bad joiner's work is abominable. Good yellow deal or pitch-pine, free from sap or shakes, and obtained from Christiania, is as important a material for use in joiners' work, as is Baltic timber from Memel or Riga for carpenter's work. You may always know where timber comes from; there are trade-marks put at the end of every plank, and in "Spon's Builders' Pocket Memorandum Book" the corresponding letters are all given, along with all the rules which are necessary to be known in order to secure good building, and to know how to measure and value it when done. Do not be led away by pretty casements. Stick to the old rising sashes. Nothing is better for keeping out weather or for ventilating purposes. In my lecture on ventilation I shall have something more to say on this subject; in fact, I fear I must defer mention of many internal contrivances till I can consider them in connexion with their bearing on ventilation and hygienic considerations generally.

Do not strain after empty grandeur; do not covet heavy plaster cornices and central rose-flowers; do not insist on big architraves and other mouldings,—a bead or a splay is often quite as effective, and does not harbour so much dust and dirt; do not try to save by pinching the price given for ironmongery: a few shillings make all the difference between misery and comfort in the use of good locks and furniture and fastenings generally.

Do not put iron pulleys to sashes to get rusty, instead of brass, that will not rust; but do not despise lacquered ironwork,—it is stronger than brass, and does not tarnish by damp, and costs nothing to keep clean.

Have good sound flooring, 1¼ in. thick, for ground-floor rooms, and let them be tongued, and stain and varnish them for 1 ft. 6 in. or 2 ft. all round, and you will be able to carpet your house at half the cost, and have the pleasure of removing the carpets for cleaning as often as you please without trouble or injury to either floor or carpet. Exercise your common sense in building your house or in choosing your house, and before doing so buy Mr. Teale's book, illustrating the evils of bad plumbing, about which you will hear enough before these lectures are over. And inspect in this museum the disastrous consequence of neglecting this most important part of house sanitation.*

* At the close of the lecture Mr. Robins explained many of the articles exhibited in the museum. Mr. Rutherfurd, director of a building society, proposed a vote of thanks to Mr. Robins and the executive committee, and expressed a hope that, before long, the museum would be sufficiently well supported to enable the committee to arrange for the delivery of such lectures with better accommodation, so that a larger number might benefit from them. Mr. H. Rutt seconded, and the resolution was carried unanimously.

SANITARY ASSURANCE ASSOCIATION.

A MEETING of the members and subscribers of this Association,—convened to receive the report of the provisional committee appointed to consider the means of organising the society and of carrying on its work,—was held on Tuesday evening at the Langham Hotel, Sir Joseph Fayrer, M.D., in the chair.

Mr. Mark H. Judge, the surveyor *pro tem.*, read the report of the provisional committee, who stated their conviction that it was desirable, firstly, "to promote the establishment and maintenance of sanitary arrangements among all classes of the community, and in every household, so that the public health might be guarded and improved;" secondly, "to leave the execution of works recommended by their officers to such persons as the members or subscribers might themselves elect." The committee further reported that, having ascertained the views of persons prominently connected with sanitary questions, and others desirous of assisting the movement, they had come to the conclusion that the best means of organising the Association (the members not proposing to provide a capital divided into shares or otherwise) was by incorporation under the Act of 1867, 30 & 31 Vict. c. 131. By that statute, in order that an association, formed for any useful object which did not involve the division of profit, might be granted the privileges of the Act, the licence of the Board of Trade must be obtained, for which purpose a draft of the proposed Memorandum and Articles of Association must be previously submitted to the Board, and, if they were approved, a licence would be granted. Accordingly the committee now submitted the Memorandum and Articles of Association for the approval of the members and subscribers.

The Chairman then moved, "That the report of the provisional committee be received and adopted, and that the first executive council be now elected, with power to have the Association incorporated in accordance with the recommendations of the provisional committee, with such alterations and additions as they may consider necessary." In the course of his remarks, Sir Joseph Fayrer insisted on the necessity of such an association being formed, especially on account of the enormous and crowded population of London, where the death-rate, considering all the circumstances, was, he thought, marvellously low, although it could, no doubt, be materially reduced by due regard being paid to the sanitary condition of the houses of the people.

Professor Corfield seconded the motion, saying that he thought a workable scheme had been put forward by the provisional committee.

The motion was carried unanimously.

Mr. J. G. Romanes, F.R.S., moved the next resolution, to the effect that Sir Joseph Fayrer; Mr. George Aitchison, F.R.I.B.A.; Professor Corfield; Professor De Chaumont; Mr. Mark H. Judge; Professor T. Hayter Lewis; Mr. H. Rutherfurd, barrister-at-law; and Mr. T. Roger Smith, F.R.I.B.A., be the first executive council of the Association.

Dr. Poore seconded the motion, and observed that the Association had a vast field of work before it. Every medical man was aware of the prevalence of disease caused by unhealthy dwellings, and he hoped the time would come when what had been called "adulterated" houses would not pay for building,—and that time *would* come if people would refuse to live in houses which could not be certified as healthy. Not only the poor, but the rich, were deeply concerned in the matter, for many of the mansions of the rich were mere decorated and gilded pest-houses.

The resolution was adopted.

Professor Tyndall, in moving a vote of thanks to Sir Joseph Fayrer for presiding, said the Association was one which, if supported as it should be, was capable of conferring great benefit on the community.

The motion having been seconded by Mr. Rutherfurd, was adopted, and the proceedings terminated.

Mr. Inderwick on Tithes.—Mr. F. A. Inderwick, Q.C., M.P., addressed a meeting on Saturday last at Hastings, in connexion with the newly-formed East Sussex Branch of the Farmers' Alliance. The mayor (Mr. Alderman Gausden) presided, and about 100 farmers were in attendance. Mr. Inderwick explained the law relating to tithes, and stated he was preparing a Bill to be laid before the next session of Parliament on the subject. Tithes were the property of the nation, and not of the subject. Parliament, he said, had never hesitated to deal with tithes when it thought proper in the interest of the public. He proposed to make extraordinary tithes redeemable at a certain charge, and suggested a nine years' purchase. After much consideration he had come to the conclusion that a nine years' purchase was the proper amount. He had spoken to several members of Parliament on both sides of the House ont he matter, and they had promised their hearty support to the principle of the Bill, though not fully concurring in some of its details.

THE ORIGIN OF THE ARCHITECTURAL ASSOCIATION.

Sir,—In the account of the origin of the Architectural Association, recently given by my friend Mr. Phené Spiers, what little I did in the matter is referred to so very kindly that I am prompted to add a little in the way of gossip to complete the picture of the birth of my favourite soc ety.

The real origin of the movement is traceable to a letter which was published in the *Builder* about Christmas time, 1846, written by Mr. Charles Gray, who, if my memory serves me well, became afterwards the first honorary secretary of the Association, and whose name ought to be held in especial honour. Mr. Gray was then a pupil in an architect's office, and he complained boldly of the want of a proper system of professional education, proposing that if masters would not, or could not, teach their pupils, the pupils should attempt to obtain instruction elsewhere. This letter brought about a little consultation amongst a few young men, when it was discovered that a Society of Architects' Assistants existed, although in a condition of what I will call repose. Their number was small; but they were of the class of exceedingly respectable middle-aged married men, and therefore perhaps a trifle slow. Mr. James Wylson (long at the head of the office of Mr. Sydney Smirke) was their president, and Mr. Jayne their secretary; the other members were the two Messrs. Colling, Messrs. Drayton Wyatt, William Young, Sayer, and three or four more. Mr. Wylson had gone to Glasgow a year or two previously, but Mr. Jayne (whom I was glad to see evergreen the other day) received us with the utmost friendliness. We thought it might be advantageous to found our proposed society in some way upon the basis of this little club. The address on "Architectural Education" was, by permission, read at their place of meeting, Mr. Jayne's rooms, in Southampton-street. They themselves attended, and we mustered as many younger friends as we could. The result was a resolution to get up a society, not like theirs, a fraternity of the permanent assistant class, but an instruction-guild for architectural youth of an aspiring turn. Accordingly, *they joined us; we did not join them.* Having existed for only four years, and with such indifferent vitality, they had no traditions to surrender, and gave place loyally to our broader purpose. The Association of Architectural Draughtsmen confessed failure, and passed away; while the Architectural Association, full of hope, came into being. Lyons' Inn Hall (where the Globe Theatre now stands) was adventurously taken for the weekly meetings, and we resolved to make our appearance before the world with a special gathering. Two gentlemen of influence now appeared in the character of practical helpers, namely, Professor Donaldson and Mr. George Godwin. They came down to Lyon's Inn, listened to our speeches, gave us speeches in return, and from that day to this have never ceased to back up the Architectural Association. Pray, therefore, let not their agency be forgotten; nor that of Mr. Gray; nor that of the *Builder* journal. I may add that Professor Cockerell and Mr. Beresford Hope deserve the credit of having helped us also. They came down one night and condescended to hear a paper read; and, as it happened, we had a lively meeting in consequence of the great Amateur too flatly contradicting the great Academician. The amazement of the Professor was splendid. "Sir," he exclaimed, "I knew the gentleman's father! And he held different opinions."

Of the original "Draughtsmen," several became respected presidents of the Association,—Mr. James Colling, Mr. Drayton Wyatt, and I think, Mr. Young; but I need not say that adolescent architecture proper had no difficulty in producing presidents out of its own fertile resources.

The great distinction between the Draughtsmen and the Association was that the one was a small and unsuccessful benefit-club, and the other an important educational institution, calculated to accomplish any amount of usefulness the times may require. Robert Kerr.

Sir,—As my name has been mentioned by Mr. R. Phené Spiers, in connexion with the origin of the Architectural Association, I consider that it is only justly due to the memory of the late Mr. James Wylson, whom we all liked and respected, to say that he was the sole originator of the "Association of Architectural Draughtsmen." I and others assisted him, but the idea originated with him. He drew up the first rules, and called together the first meeting, which was held at the coffee-house in Castle-street, Holborn. James K. Colling.

THE PUTNEY VESTRY AND THE PROPOSED NEW TRAMWAYS AND RAILWAYS IN THE PARISH.

The Putney local authorities have decided to oppose the proposed introduction of tramways into the parish, and have also concluded to resist the project of the Metropolitan District Railway to construct a new line across Putney Common. At a meeting of the Vestry which has just been held, the members unanimously expressed themselves as strongly opposed to tramways being brought into the parish, and the Putney members of the Wandsworth District Board of Works were instructed to oppose the tramway scheme at the Board. The memorial against the undertaking being permitted was agreed upon. The proposal of the Metropolitan District Railway to extend their line to Wimbledon by crossing Putney Common was also opposed at the meeting, and a resolution adopted to the effect that the Conservators be requested to oppose any encroachment on the Common. The proposed new bridge likewise formed a subject of discussion at the meeting, in the course of which it was incidentally stated that the new structure would be wider than Waterloo Bridge. A sketch showing how the High-street would be affected by the approach to the proposed bridge was ordered to be placed on the churchyard wall for the information of the parishioners.

BUILDING LAND AT WILLESDEN AND SNARESBROOK.

Several plots of building land in the neighbourhood of Willesden were sold last week by Mr. Belton. They included, amongst others, a number of plots on the Neasdon Station estate, described as eligible for the erection of shops and the better class of houses. Some of the plots, having frontages to Neasdon-lane, of 18 ft., were sold for 90*l.* each, whilst a number of others realised 110*l.* each. A plot, with a frontage to Vicarage-road of 17 ft. 6 in., was sold for 65*l.* It forms a portion of the property known as the Willesden Church Estate. Numerous plots in Willesden-lane and on the Willesden-green Estate were likewise offered. Various plots, having frontages to a new thoroughfare called Cobbold-road, of 15 ft., were sold at 35*l.* and 36*l.* each, and 40 other lots, having frontages of 16 ft., were sold for from 40*l.* to 45*l.* each. Five plots on the Willesden-green Estate, having frontages of 20 ft. to Willesden-lane, were sold for 90*l.* each.

Mr. F. M. Whittingham offered, at the Eagle Inn, Snaresbrook, twenty-eight lots, on an estate close to the Snaresbrook Railway-station and to the Wanstead main road, and in the immediate neighbourhood of Epping Forest, several of the plots being described as eligible for the erection of first-class villas. It was stated that the property was offered free from all rights of the Conservators of Epping Forest, the rights having been purchased under an award made by the arbitrators under the Epping Forest Arbitration Act. A considerable number of the lots, which have frontages of 20 ft., and an average depth of 100 ft., were sold at the rate of 5*l.* 10*s.* per foot frontage, or about 110*l.* per plot.

WORK IN MOSAIC.

The apse of St. Peter's, Bayswater, has been decorated with an important work in Venetian mosaic. The subject is Leonardo da Vinci's "Last Supper," and the work has been executed by Messrs. Burke & Salviati. The treatment differs from the original in the arrangement of the background. Instead of showing the side of a square room in which the Last Supper took place, it has been arranged to suit the semicircular surface of the apse, and its features are made to harmonise with the leading lines of the architecture in this part of the church. The copy for the mosaicists was made by Mr. A. Booker from the copy of Leonardo's work by his pupil Oggione, which is possessed by the Royal Academy. Oggione's copy is of the same size as the original, and was probably painted under the supervision of Da Vinci himself, and may therefore be relied on as expressing faithfully the spirit and the drawing of the original. The whole has been executed under the direction of Mr. Chas. Barry, from whose design the arrangement of the background was made. The cost, which is very considerable, will be borne by the widow and family of a late churchwarden, who took interest in the fabric of the church.

COMPENSATION CASES.

ARTISANS' DWELLINGS ACT.

At the meeting of the Metropolitan Board of Works held on the 10th inst., the solicitor read the following report:—

Artisans' and Labourers' Dwellings Improvement Act, 1875.—Goulston-street Scheme.—I have to report an important inquiry which took place at the Sheriffs' Court last Wednesday, on the appeal of the Board against the award of Mr. Hunter Rodwell. The subject matters of the claim were thirteen houses held on long lease in Castle-alley, High-street, Whitechapel; also a long leasehold interest in 8, 9, and 10, Inkhorn-court; and a copyhold or inheritance in six houses, 1 to 6, Inkhorn-court. It is impossible to speak too strongly of the disgraceful character of these premises, the approaches from High-street, Whitechapel, being some 3 ft. wide, and the courts being of wholly insufficient width for sanitary requirements, the houses also being in a wretched state of disrepair and dirt. The claimant is of the Jewish persuasion, who, no doubt, made his living by collecting the weekly rents of these houses and of other property of a similar kind in the neighbourhood. I ascertained that numerous notices under the Nuisances Removal Act had been served upon the claimant, and this was duly proved at the inquiry. Three claims were delivered amounting to 6,675*l.*, and the gross income derived from the property was, as put in evidence by the claimant, 617*l.* per annum. Mr. Rodwell's provisional award amounted to 3,100*l.*, but upon hearing the claimant's adviser before making the final award, he increased his award to 4,874*l.*, the valuation of the Board being 2,771*l.* The committee directed an appeal to be lodged against the final award. At the inquiry at the Sheriffs' Court last Wednesday, Mr. Meadows White, Q.C., and Mr. Freeman appeared for the Board, and Mr. Willis, Q.C., and Mr. Mugiston for the claimant. I, of course, arranged that the jury should take a careful view of the premises, and it was clear throughout the inquiry that they took the strongest view against the claimant, and but for the summing-up of the Under-Sheriff, who called their attention to the fact that the Board itself had valued the property at 2,770*l.*, I have no doubt that the jury would have given a verdict for less than the Board's figures. They did, however, return a verdict for the exact amount given in evidence by the Board,—that is, 2,770*l.*, or 2,100*l.* less than Mr. Rodwell's final award. In addition to this, the claimant will pay his own costs, less 30*l.* certified by the Under-Sheriff as payable by the Board. This is another illustration of the extreme uncertainty of the verdicts of juries, as the committee may recollect about three weeks since property of the same character, almost adjoining this, and belonging to Mr. Thurgood, was the subject matter of an appeal against Mr. Rodwell's final award. The jury in that case, after a view, did not express any opinion as to the character of the property, and gave a verdict for 1,950*l.*, or 200*l.* only under Mr. Rodwell's award, and 700*l.* more than the Board's figures.

On Wednesday last Mr. Under-Sheriff Burchell presided over a special jury at the Middlesex Sheriff's Court in the appeal "Churchwardens of St. Luke's *v.* The Metropolitan Board of Works." Sir H. Hunt, the arbitrator, had made an award, and the churchwardens demanded a jury to assess the value of the property, consisting of a house on lease for eighteen years, and the reversionary interest. The contention was as to the reversion. The house was in Golden-lane, St. Luke's, and was required for artisans' dwellings. Evidence on both sides was given as to the reversionary interest, and the difference in the estimates of the surveyors was somewhat large. The jury, which consisted of only eight, no tales having been prayed, inspected the property, and the result was a verdict for 900*l.* As the amount exceeded the award the appellants had their costs allowed.

WOLVERHAMPTON STREET IMPROVEMENTS.

Mr. M. F. Blakiston, the acting under-sheriff of the county of Stafford, sat in the Sessions Court of the town-hall, Wolverhampton, two days last week, to hear an appeal of the trustees of the late John Savage Davenhill against the award of the arbitrator under the Improvement scheme in respect of property situated at the Queen-square end of Lichfield-street, which is required by the Corporation under the scheme for the purpose of the projected main street to replace Lichfield-street.

The property is a half-timbered house occupied by a relation of the late Mr. Davenhill.

Mr. Underhill (town clerk, appearing for the Corporation) said that as the property was not in the unhealthy area under the scheme, its purchase would come under the Lands Clauses Act, the provisions of which allowed that besides the actual value of property purchased, the owners should receive compensation to the extent of 10 per cent. on the intrinsic value for compulsory sale. The area of the

property was 132 square yards, which, at the very high figure of 10*l.* a square yard, would give 1,320*l.* as the price of the land; or, putting it at the (for Wolverhampton) fabulous figure of 2*l.* a yard, would amount to 2,640*l.* If the place had to be rebuilt as it stood, it would not cost more than 1,200*l.*

The evidence of valuers was, as usual, very contradictory, those for the Corporation putting the total to be paid at between 4,000*l.* and 5,000*l.*, and those for the appellants at between 9,000*l.* and 10,000*l.*

The jury awarded 6,766*l.*

ARCHITECTS' ACTIONS.

HANCOCK *v.* BAKER AND SONS.

THIS was an action in the High Court of Justice, Common Pleas Division, before Mr. Justice Lopes, brought by Mr. W. St. John H. Hancock, an architect, of Furnival's Inn, to recover from Messrs. Baker & Sons, auctioneers, a sum of 66*l.* 10*s.* for professional services.

It appeared that defendants had originally been in communication with another gentleman respecting laying out an estate for selling in plots, and making roads thereon, who, before any work had been done, was obliged to retire from business, owing to illness. Mr. Hancock was asked to take up the work, and it appeared in evidence that he stated to Messrs. Baker & Sons that he would do so on his own account, to which, according to plaintiff's evidence, the defendants assented.

The work in question was done in 1877-8, covering nearly six months. Some months after the work had been done and the estate put up for sale, defendants, being asked for payment, denied their liability to pay plaintiff, stating that they had never employed him.

A great deal of correspondence was put in, and several witnesses examined, the hearing of the case occupying part of three days.

The jury had to decide as to whether the plaintiff (who did the work) was to receive pay, or the estate of the former surveyor (who was a bankrupt)? Was the statement of the plaintiff or that of the defendants to be relied upon?

On these questions the jury gave a verdict for plaintiff for the full amount claimed.

Mr. Bigham and Mr. Frank Safford, instructed by Mr. S. J. Debenham, of Lincoln's-inn-fields, were for the plaintiff, and Mr. Talfourd Salter, Q.C., and another learned gentleman, instructed by Messrs. Blew & Tyler, were for the defendants.

WHAT PART OF A SHOP-FRONT BELONGS TO A SHOP?

HAYES *v.* CORDINGLEY.

THIS somewhat curious action was tried in the Exchequer Chamber about a week ago. The plaintiff, Mr. F. R. Hayes, an auctioneer and estate agent, has a lease of a shop on the ground story of No. 14, King-street West, Hammersmith; the shop being part of a larger shop, and described in the parcels as "all that portion of the shop now in the occupation of the said lessee containing the dimensions and abuttals more particularly delineated and set forth in the plan drawn in the margin hereof, and being a portion of the ground-floor of the premises aforesaid." The interior of the shop was tinted pink on the plan, but not anything beyond the exact internal area; the pink tint was not referred to in the body of the lease.

The defendant (the lessor) occupied the rest of the premises, including the upper floors, and the parties being recently on bad terms, he damaged the painting of the cornice and of the brattishing above it, as also of the centre pilaster, between the shop-fronts, and cut a door in a very rough way in the wooden stallboard under the shop-window, and used it for access to the basement story. The plaintiff brought his action for peaceable possession, and claimed some moderate damages. There was apparently no attempt to dispute the fact that there was an intention to annoy the plaintiff, and to damage the effect of his premises, for which a high rent was paid, the only question being, were the parts in question demised to the plaintiff or not? It was proved that, previously to the lease being granted, in November, 1876, the lessee had painted all the parts over which he now claimed control.

Mr. S. Flint Clarkson, architect and surveyor, gave evidence in support of the plaintiff, and was followed by Mr. Vickery. The jury returned a verdict for the plaintiff, damages 30*l.*

The evidence, and the summing up (of Mr. Justice Watkin Williams) go to establish,—(1), that a tint on any portion of a plan may be taken to have no signification whatever, unless it is specially referred to, and its meaning expressed in the body of the deed; (2), in the absence of stipulations to the contrary, the whole of a shop-front, including the entablature, will be demised with a shop. The cornice and cresting must be considered as connected with the rest, as the upper parts of a frame would be with the lower parts. In this case the ceiling of the ground-story reached only to the top of the fascia, but the whole of the upper part of the entablature is to be reckoned as part of the ground-story; (3), "occupation" may extend to the external surface of a structure. In this case, for instance, the lessee, having painted the woodwork under the stall-board (although it contained a glazed panel giving light into the basement) previously, without being interfered with, it was held that this surface was "in the occupation of the said lessee" at the granting of the lease.

THE MYSTERIES OF FIGURES.

THE following is a mathematical demonstration of the fact alluded to by your correspondent "J. H." We will first show that if the sum of the digits of any whole number greater than nine be subtracted from that number, the remainder will be divisible by nine.

Let N denote any whole number, and let p_1, p_2, p_3,...p_n, represent the digits, beginning with that in the units place, and represent the base of the common scale of notation by $r=10$.

Then $N = p_1 + p_2 r + p_3 r^2 + \ldots\ldots p_n r^n$

Subtracting $(p_1 + p_2 + p_3 + \ldots\ldots p_n)$ from both sides of the equation we have $N - (p_1 + p_2 + p_3 + \ldots\ldots p_n)$

$$= p_2(r-1) + p_3(r^2-1) + \ldots\ldots p_n(r^n-1)$$
$$= p_2 9 + p_3 99 + p_4 999 + \ldots\ldots \text{to } n \text{ terms.}$$

This equation is therefore divisible by 9, since every term on the right-hand side is divisible by 9. The above is therefore established.

We will now show that the sum of the digits of any whole number divided by 9 will leave the same remainder as the whole number divided by 9.

Adopting the same notation we have as before

$$N = p_1 + p_2 r + p_3 r^2 + \ldots\ldots p_n r^n$$
$$= p_1 + p_2 + p_3 + \ldots\ldots p_n$$
$$+ p_2(r-1) + p_3(r^2-1) + \ldots\ldots p_n(r^n-1)$$

therefore $$\frac{N}{r-1} = \frac{p_1 + p_2 + p_3 + \ldots\ldots p_n}{r-1}$$
$$+ p_2 + p_3(r+1) + \ldots\ldots p_n \frac{r^n-1}{r-1}$$

But $\frac{r^n-1}{r-1}$ is an integer, whatever positive integer n may be; therefore $\frac{N}{r-1}$ = some integer $+ \frac{p_1 + p_2 + p_3 + \ldots\ldots p_n}{r-1}$

The second case is therefore established, since $r-1=9$.

Now, by the first case it was demonstrated that if the sum of the digits of any whole number greater than 9 be subtracted from that number, the remainder will be divisible by 9. Therefore by the last case the sum of the digits in the remainder will be divisible by 9. Should "J. H." be unable to follow the demonstration, then perhaps the last few lines will satisfy him. A reply to his letter, however, hardly seems complete without a rigid demonstration.

J. G. VINE.

SIR,—In reply to your correspondent, "J. H.", although I do not undertake to explain the *whys* and *wherefores* of the peculiar property of the figure 9 to which he draws attention, I beg to subjoin the following algebraical symbol for the "trick," which will make the peculiarity of the "9" element more apparent.

Suppose a, b, c, d, e, f, g, h, represent eight figures, the problem will become:—

$$10000000a + 1000000b + 100000c + 10000d + 1000e + 100f + 10g + h - (a+b+c+d+e+f+g+h)$$
$$= 9999999a + 999999b + 99999c + 9999d + 999e + 99f + 9g -$$

where 9 is the common factor. H. L.

RADIATION AND CONDUCTION.

SIR,—At the Royal Institute of Architects' discussion, on the 29th of November, more than one speaker drew a distinction between radiated and conducted heat, expressing a decided preference for the former. Mr. Robins said that radiated heat passed through the air without heating it, warming the first obstacle to its passage. Captain D. Galton says, in his "Healthy Dwellings," that air cannot be heated by the radiant heat of an open fire. Now, our thermometers indicate the temperature of the air. The heat we require, say 60°, is got by contact of the air with the walls, furniture, &c.; therefore it seems to me that our desired air temperature is got by conduction when a fire is the means of warming. Are there, therefore, any solid grounds for the distinction which is drawn? Suppose a room to be warmed up to 60° by a supply of air, warmed by passing through a chamber kept to a temperature of 70° or 80°, why should it not be as satisfactory as the warmth got from an open fire? I admit that ordinarily a room warmed by hot air is not so agreeable as one warmed by an open fire, even when the ventilation is as good, which it rarely is; but this I attribute to the fact that hot air for warming rooms is almost always passed over highly heated surfaces, very generally moving slowly over parts of those surfaces, whereby particles of organic matter floating in the air get charred.

F. LLOYD.

SANITARY SCIENCE IN ITS RELATION TO CIVIL ARCHITECTURE.

SIR,—The letter from "A.R.I.B.A.," at page 709 of last week's *Builder*, shows that there is ample room for at least some of the members of the "R.I.B.A." getting better acquainted than they are with the science of practical plumbing, and especially in its relation to the proper position and fitting-up of the sanitary appliances of houses. All soil-pipes should be put up outside of the house, and if any soil-pipe in that position freezes up, that is the punishment for some sin, viz.,—the waste of water. I do not think that, as "A.R.I.B.A." supposes, films of ice forming in the interior of the soil-pipe when it is used are the cause of the freezing up, but, as I said, some water crane or valve leaking continually into the soil-pipe, and so wasting the water. I have put outside a number of soil-pipes that were formerly inside, and heard no complaint during the late severe frost of anything freezing up; nor did I last year either. And as to the ventilating traps at the foot of the soil-pipes, &c., and upon the drains, I do not remember of hearing of a single one freezing up, although about seven thousand are now in use.

I was rather astonished to read the statement of "A.R.I.B.A." that the waste-pipe from his sink is only 1 in. in diameter. In Scotland we generally use 2½ in. waste-pipes from sinks. The smell he speaks of may likely be owing to want of ventilation. He should consult either Mr. S. S. Hellyer's book, "The Plumber and Sanitary Houses," or my own work on "Plumbing and House Drainage," and he would then gain a better knowledge of the subject than his letter leads me to suppose he at present possesses.

In reference to Mr. Norman Shaw's published plan of fitting up soil-pipes, I beg to observe that it was very crude, and open to improvement in various respects; and unless he has lately issued an improved plan correcting himself, his first plan is not one to be copied, more especially as other more practical and better plans were and are in existence.

W. P. BUCHAN.

MEASURING TAPES.

SIR,—I should think that a good stout linen tape, passed through a solution of rubber, in order to render it waterproof, would answer. I do not, however, know of any firm making such, but would gladly purchase one so made. Linen hose so prepared will last for years.

J. C. M.

LINCRUSTA-WALTON.

WHEN this material was first introduced to the public, under the title "Muralis," or "The Sunbury Wall Decoration," we were able, without any hesitation, to point it out to our readers as a particularly good and available material, and we have no cause for changing our opinion in speaking of it under its new name, Lincrusta-Walton. Trade reasons have probably led to this change, but it is not wise for all that. Still it will come right in time. When a hard-working and long-popular member of the Lower House, let us say Mr. "Bob Lowe," consents to accept a peerage, he commits temporary suicide, and disappears from the outer world under a new name as entirely as if he no longer existed. In time, however, his personality asserts itself, and the same qualities bring Lord Sherbrooke equally to the front. As the Honble. Bardwell Slote, in the "Mighty Dollar," used to say, in reply to Mrs. Gen'l. Gilflory's preference for *pomme de terre* over potato,—"Fortunately, ma'am, the vegetable tastes the same in both languages," so we have no doubt Mr. Walton's material will be equally valued, whether called Lincrusta or Muralis, because

it is a really good thing. It is in (low) relief, like wood-carving; it is waterproof and impermeable to moisture; can be washed with soap and water; and will not absorb infection. It has a comfortable appearance, can be adapted by architects to any style of building, and is applicable for dadoes, panels, cornices, friezes, borders, and folding screens. The company by whom it is supplied have just now issued a very pretty Pattern Book (7, Poultry), wherein, by means of the autotype process, as we suppose it to be, the patterns in stock are shown with marvellous fidelity and effect, the patterns themselves exhibiting so much good taste and skill in design and drawing as to make it obvious that intending users may safely place themselves in the hands of the company. Care is required in cutting and fixing the material. The latter is done with glue and paste, made (in the proportion of one-third of the former to two-thirds of the latter) as thick as it is possible to use it, and laid on lightly with a stiff brush. "Then take a piece of lincrusta and attach it to the wall under the cornice by means of gimp pins, and gradually press it to the wall, making the joint good until it reaches the bottom. In doing this, care should be taken to work from the centre outwards, so as to avoid the air getting under the piece and preventing adhesion." Very rich effects, we will add in conclusion, may be obtained by decorating the Lincrusta in colours.

CAN A BUILDER CHARGE FOR AN ESTIMATE?

Sir,—I should be glad if some of your correspondents would enlighten me as to the following, viz.:—

"An architect invites two or three builders of equal merit to tender for works in alterations and additions (700*l.*) where quantities are not supplied. On opening the tenders the difference is so trifling that the architect's client accepts one above the lowest, although the usual clause, 'the lowest or any tender not necessarily accepted,' is omitted to be mentioned."

In a case like the foregoing I certainly think a builder can send in a claim to the client of, say, two per cent. for the taking out of quantities and preparing of estimate.

If, in your next issue, some of your correspondents will give their opinion, and kindly state if such a case has been decided in a court of law, they will confer a favour on many builders. W. B.

VARIORUM.

A fifth edition of "The Proportions of the Human Figure," by the late Joseph Bonomi, just now published by Charles Robertson (Long Acre) contains a photograph and short memoir of the much-regretted author. It also includes a list of authorities on the subject. The scope of the work we have before now stated and commented on.——*Nature* of December 9th has an interesting article showing what has been done by science towards the prevention of the vine disease in France due to the *Phylloxera*. Two maps show the extent to which its ravages have spread.——With No. 3 of "Decoration" (Sampson Low) a decorative picture, "Karlavagh," designed by Mr. Moyr Smith, is presented.——Part 1 has been published of a new issue of Cassell's "Cookery," a very useful book of its kind. It will be completed in thirteen sixpenny parts.——The same firm have also commenced a new issue of the "Popular Educator."——The *Garden Oracle* for 1881, edited by Shirley Hibberd, maintains the reputation for usefulness acquired by previous issues. We give a quotation that may be useful as to an aquarium and fern-case combined:—"The whole of the rock-work should be built on a wooden floor, and when thoroughly set should be put into water and remain immersed for at least a month, to season it thoroughly; for new cement is poisonous to fishes, and therefore undue haste in this work tends of necessity to a break down. In stocking the tank you need not introduce any vegetation at all, but a clean bed of well-washed pebbles and a few fishes only. But if you wish to have a little vegetation at once plant a few tufts of Vallisneria only; if you introduce a variety of water-plants you will come to grief speedily. The whole affair ought to be in full working order a month or so before any fishes are put in, and during that time of probation the water should be changed twice a week at least. We now come to the subject of the fishes. These should be few and small, and of the most peaceable disposition. The lovely gold carp is the most suitable of all, but any other kinds of carp may be adopted. Minnows and bleak are suitable, but scarcely desirable, as they soon suffer if the water should be insufficiently oxygenated. Such interesting but delicate fishes as the eel, the stone loach, and the miller's thumb are really quite unfit for the purpose. The principal object is not to secure a zoological collection, but a beautiful object. The ferns will, of necessity, comprise such as thrive when constantly bathed with moisture, and the filmy ferns, such as *Trichomanes radicans* and *Hymenophyllum tunbridgense*, are the best. The small species of *Todea* will answer, as will also our pretty Britishers, the wallrue, *Asplenium ruta-muraria*, and the sea spleenwort, *A. marinum*.——The eighteenth annual issue of the *City Diary*, published at the office of the *City Press*, 154, Aldersgate-street, has just made its appearance. In it will be found, as before, a great deal of information respecting official life in the City, together with the customary matter of an almanack.——"The Golden Mark," the Christmas number of the *Quiver*, contains a large amount of good reading and illustrations for 6d.——The December number of Harper's *Monthly Magazine* for both quantity and quality is noticeable. It is now published by Sampson Low & Co.——"The Belgravia Annual" and "The Gentleman's Annual" (both published by Chatto & Windus) include many good stories of their kind.——According to the *British and Colonial Printer and Stationer*, "Cherry Ripe" the supplement to the Christmas number of the *Graphic*, was produced in fourteen printings at a speed slightly exceeding 800 sheets per hour, two on a sheet, and that no fewer than 400,000 copies have already been produced and sold.—The second volume of the *Antiquary*, edited by Mr. Edward Walford, M.A., which consists of the parts published between July and December, affords much interesting reading to those who find pleasure in the study of the past. The *Antiquary* supplies a want.

Miscellanea.

Wilmslow Sewerage.—The Wilmslow Local Board of Health have for several years past been trying to obtain a satisfactory scheme for the complete sewerage of their district, which includes the village of Wilmslow and the surrounding residential and agricultural district of 6,907 acres, with a present population of about 7,000. About eighteen months since the Board offered premiums of 100*l.*, 50*l.*, and 25*l.* for the best schemes for sewering and disposing of the sewage of the district. A large number of plans were sent in by engineers, and Mr. J. G. Lynde, C.E., formerly city surveyor, of Manchester, was called in to advise the Board as to the merits of the several schemes; and the Board subsequently awarded the first premium to Messrs. E. Corbett & Sons, of Manchester; the second premium to Messrs. Brierley & Holt, of Blackburn; and the third premium to Mr. Vawser, of Manchester. Messrs. E. Corbett & Sons' scheme is on the "separate system" for collecting only sewage in the new sewers, leaving the rainfall to be conveyed by existing drains, streams, &c. The scheme provides for a northern and a southern outfall of 15-in. glazed earthenware pipes, jointed watertight in cement, with branch sewers of 12-in. and 9-in. pipes. A sewage-farm of about 57 acres is proposed on or near Lindow Common (where deep sand is overlaid by peat of varying thickness). The sewage is to be raised from the two outfalls, a height of about 45 ft., to the farm, by means of Shone's patent sewage-ejectors, worked by compressed air from an engine at the farm. The estimated cost of the whole scheme is as follows:—19,095 yards of pipe-sewers and 170 manholes, 6,500*l.*; air-compressing engines, boilers, ejectors, rising-mains, air-pipes, and buildings, 4,250*l.*; sewage farm, farm buildings, drainage, &c., 4,800*l.* Total, 15,550*l.*

Silver Work.—Mr. J. W. Benson has had the honour of exhibiting for her Majesty's inspection a silver model made in imitation of the Albert Memorial for the late Siamese Embassy. It has now been shipped for Siam. It is a remarkable work, more than 7 ft. in height.

Window Cases for Queen Anne Houses.—"Can any be obtained?" says a correspondent. Yes, certainly! Messrs. Dick Radclyffe & Co., of High Holborn, have prepared some purposely, as our advertisement columns show.

Bells, Lincoln Cathedral.—On Saturday last the new clock and set of quarter bells provided for Lincoln Cathedral were formally opened by the Dean, in the presence of the members of the chapter, priest, and vicars, and other officials of the cathedral, as well as Messrs. N. Clayton and A. Shuttleworth, members of the celebrated firm of agricultural implement makers, the donors, in conjunction with Mrs. Seely, the wife of Mr. Charles Seely, M.P. for Lincoln, of the quarter bells. The new clock, which has been provided at the expense of the Dean and Chapter, takes the place of one by Thwaites, dated 1775, subsequently altered by Vulliamy. It has been constructed by Messrs. Potts & Sons, Leeds, under the superintendence of Sir Edmund Beckett. The bells, which are arranged for the well-known "Cambridge quarters," are from the foundry of Messrs. Taylor, Loughborough, the founders of the new peals of St. Paul's and Worcester cathedrals. They weigh respectively 27 cwt. 2 qr. 7 lb., 13 cwt. 0 qr. 14 lb., 12 cwt. 3 qr. 24 lb., and 11 cwt. 0 qr. 10 lb. The crowning-stone was laid of the newel of the spiral staircase of the south-western tower, thus formally signifying the completion of the work in which the Chapter has been for some years engaged, under the direction of Mr. J. L. Pearson, R.A., in tying together the magnificent western façade (which was bulging outwards to an alarming extent), rebuilding the lower part of the south-west tower (which had become so rent and shattered as to threaten imminent ruin), and strengthening the whole.

The Society of Engineers.—The twenty-sixth annual general meeting of the members of this Society was held on Monday evening last, the 13th inst. The retiring president (Mr. Joseph Bernays) occupied the chair. The following gentlemen were balloted for and duly elected as the council and officers for the ensuing year, viz.:—As president, Mr. Charles Horsley; as vice-presidents, Mr. J. Church, Mr. F. E. Duckham, and Mr. Arthur Rigg; as ordinary members of council, Mr. S. Cutler, Mr. C. Gandon, Mr. Perry F. Nursey, Mr. Thos. Porter, Mr. W. Schönheyder, Mr. R. Berridge, Mr. C. J. Light, and Mr. Henry Robinson, the three last-named gentlemen being new members of the council; as honorary secretary and treasurer, Mr. Alfred Williams; and as auditor, Mr. W. H. Bennett. The president announced that premiums of books had been awarded by the council to Mr. G. M. Ward for his paper on "The Utilisation of Coal Slack in the Manufacture of Coke for Smelting," and to Mr. W. Worby Beaumont for his paper on "Steel as a Structural Material." The annual dinner of the Society was held on Wednesday evening.

Proposed Tramway between Warwick and Leamington.—The Leamington and Warwick tramway extends along a route of about 5,377 lineal yards, and consists of about 4,859¾ lineal yards of single line, and 517 lineal yards of double line in crossings, passing-places, &c. The undertaking is now assuming a very practical and complete form; plans, sections, details of rails, crossings, specifications, and bills of quantities having been prepared by Mr. E. Pritchard, C.E., of Birmingham and London. In answer to an advertisement which appeared in the *Builder* and other newspapers, some time ago, about a dozen contractors have since inspected plans at Mr. Pritchard's offices, and the directors have since received tenders for the works. The new tramway will consist of a continuous iron sleeper, 90 lb. to the lineal yard, laid upon a bed of concrete, having a rolled steel rail 34 lb. to the yard let into the sleepers, and secured at intervals of 18 in. with wrought-iron pins, in the form of a wedge. No timber whatever will be used in the system.

Church Warming.—Mr. R. S. Dunbar, of the Thames Bank Iron Company, has warmed the Catholic Apostolic Church and the Cloisters, Gordon-square, by a system of hot-water boiler and pipes placed above the floor. This very large church has for a long time past been without any heating apparatus, but recently the committee called in the assistance of Mr. Dunbar, and the result, at the cost of 337*l.* 10s., is said to be satisfactory.

The Abbey Church of Romsey, Hants, has just received the addition of a stained-glass window, representing Christ leading the Blind Man. It is in memory of Caroline Maria Noel, youngest daughter of the Hon. and Rev. Gerard T. Noel, and cousin of the present Earl of Gainsborough, and has been well executed by Messrs. Mayer & Co., of Munich and London.

The Re-valuation of the Metropolis.—The results of the re-valuation of the metropolis, a work which has occupied the various districts during the year, have been reported to Mr. Jebb, the chief clerk of the Metropolitan Asylums Board, which is the authority under the Act (the Metropolis Valuation Act, 1869) to issue the return. This is the second quinquennial valuation. The metropolis shows a vastly increased value, owing, not only to the increase in the number of buildings, but to the rateable value of houses having been raised by the local authorities. When, in 1871, the list was first issued, the gross value of the metropolis was 24,176,338*l.*, and the rateable value 19,900,072*l.* The returns now given in show a gross value of 25,785,556*l.*, and a rateable value of 23,697,405*l.* These totals, however, do not include the City of London, whose rating authorities have not yet sent in their returns; nor Poplar, nor the Middle Temple. The gross value of the City of London is estimated at 3,953,707*l.*, and the rateable value at 3,313,522*l.* The rateable value of Poplar is estimated at 311,895*l.*, on the gross of 423,796*l.* The Middle Temple is estimated as likely to give in its returns 10,929*l.* of rateable value on a gross of 13,144*l.*,—a total increase of 50,000*l.* on the three places. Hence the returns will be,—gross value, 33,176,203*l.*, and a rateable value of 27,833,751*l.*; an increase in the second quinquennial period of 5,079,391*l.* gross, and 4,679,112*l.* rateable; and a total increase in the ten years of 8,999,865*l.*, and 7,933,679*l.* The largest assessments of gross value, next to the City, are Kensington, 1,969,501*l.*; St. Pancras, 1,828,828*l.*; Islington, 1,757,589*l.*; Marylebone, 1,659,874*l.*; St. George's (Hanover-square) Union, 2,728,318*l.*; and Lambeth, 1,577,631*l.*

A Verdict of a Penny a Month.—In the Warwick County Court, on Tuesday last, a case was heard before Sir Richard Harington, bart., judge, in which Messrs. Denston & Co., glass and lead merchants, Birmingham, were the plaintiffs, and William Roberts, builder, Leamington, the defendant. The action was brought to recover 14*l.* 13*s.* 3*d.* for goods sold and delivered. It appeared that the debtor some months ago filed a petition in the Warwick County Court, for the liquidation of his affairs by arrangement. The creditors agreed to accept a composition of 3*s.* in the pound, payable in a month, on the joint security of the debtor and of Mr. George Grove, ironmonger, Leamington. Mr. Grove in due time gave his own cheques for the amount to each creditor, and one for 2*l.* 4*s.* was accordingly forwarded to the plaintiff, who declined to accept it, as the offer was not strictly in accordance with the terms of the resolution. The judge made some comments on the proceedings, and gave a verdict for the plaintiff without costs, and one penny per month.

Parliament Street.—The site occupied by the two old houses with projecting shops situate 53A, to 54, Parliament-street, abutting in the rear on Cannon-row, and on the site of the Grand National Opera-house, has now again been disposed of by Mr. Robins, of Waterloo-place, Pall Mall. In 1874 the property was sold by auction to Mr. Mapleson for the purpose of forming a direct approach to the new Opera-house from Parliament-street, but the purchase was not completed. Its re-sale points to an immediate movement in connexion with the site of the Opera-house on the Embankment, while the demolition of these old houses, whose incongruity with their more modern surroundings is very remarkable, will considerably improve the appearance of this part of Parliament-street. We understand the price now paid is equivalent to 7*l.* per foot super.

District Surveyorships, Streatham.—At the meeting of the Metropolitan Board of Works on the 10th inst., it was agreed, on the recommendation of the Building Act Committee, that the district of Streatham and Brixton (part of Lambeth), vacant by the decease of Mr. John Mullins, be divided into two districts, to be designated East Streatham and Brixton (part of Lambeth), and West Streatham, respectively; and that the centre line of Brixton-hill, Streatham-hill, and Upper and Lower Streatham, do form the line of boundary between such districts. It was further agreed to proceed to the elections at the meeting of the Board this Friday, the 17th inst.

Patent Pendulum Pump.—The Bronze Medal of the Mining Institute of Cornwall has been awarded for the above pump to Mr. J. Stannah, engineer.

Ventilation of the School Board House. At the weekly meeting of the School Board, on the 9th inst., Dr. Richardson was permitted, as a matter of emergency, to make a statement as to the ventilation of the Board-room, and the corridors and rooms adjoining. He said that he and the architect to the Board had, during the past three weeks, been looking into the arrangements for ventilation existing in connexion with the building in which the Board were in the habit of meeting. He had come to the conclusion that the ventilation of the Board-room was a matter of great emergency. The room in which the Board sat should be one they could occupy without dangerous results. Without desiring to cause any unnecessary alarm, he felt bound to say that the members incurred danger by sitting in this room. The architect was of opinion that the necessary alteration in the ventilating arrangements might be made in a month or six weeks. That would involve the Board meeting in another room for some time, and it would also involve expense. In the opinion of the architect the expense would be about 300*l.* He (Dr. Richardson) imagined it would be more, but 300*l.* might be taken as about the cost. He, therefore, moved that it be referred to the Works Committee, to consider and draw up a proposal as to the warming and the ventilation of the Board-room, the landings adjoining, and the ladies' room. Mr. E. Buxton (vice-chairman of the Board) seconded the proposition. After some opposition from Mr. Bonnewell, who suggested that the lighting of the room should be also inquired into, the motion was carried unanimously.

South London Water Supply.—Notice is given of a Bill to be introduced into Parliament next session for the incorporation of a company to supply the southern districts of London with water to be obtained chiefly from springs in the neighbourhood of the Basingstoke Canal and other places on the borders of Hampshire and Surrey. Power is sought to transfer the undertaking to any trust that may be formed to control the water-supply of the metropolis. It is stated that from the sources specified in the notice about 13,000,000 million gallons daily could be obtained.

Street and Road Tramways.—A Parliamentary paper shows that there are in the United Kingdom 3,680 miles of street and road tramways open, from which (for passengers, parcels, mails, animals, goods, minerals, &c.) 1,342,933*l.* have been received, and upon which 1,113,094*l.* have been expended. This leaves a balance of receipts of 229,839*l.* The total number of passengers who have travelled on the tramways is given at 173,067,103; the mileage run at 23,842,000; the number of horses at 12,392, of locomotive engines at 17, and of cars at 1,619.

"Fogs and Mahogany."—Mr. W. J. Prim, Resident Engineer at the Houses of Parliament, writes to say that he never made the statement attributed to him by a speaker at a recent meeting (mentioned in our columns) "that the fog in the Houses of Parliament, which was occasionally found when no fog existed outside, was due to the quantity of mahogany wood employed in the building," for, as a matter of fact, oak is almost exclusively employed for the furniture and fittings in those buildings.

Female School of Art.—Her Majesty the Queen has again signified her approbation of the work of the Female School of Art, 43, Queen-square, Bloomsbury, by purchasing a life-study in water-colour. We understand that there will be some specimens of wood-carving by female students on view at the annual exhibition on the 22nd and 23rd inst.

Folklore of Old Japan.—At a meeting of the Birmingham Philosophical Institute, last week, Mr. Pfoundes read a paper on "The Cosmogony Legends, Witchcraft, Spirit Rapping, and other Superstitions of Japan." Native illustrations and photographs were exhibited by the lecturer.

Bribes.—More than one architect complains to us of a circular sent out by some "Sanitary Engineers" in the Blackfriars-road, offering to allow them 10 per cent. commission on all the said engineers' goods the architect may specify. Manufacturers ought to know by this time that such offers simply do them mischief.

The Strike at the Welsh granite quarries, South Carnarvonshire, terminated on the 13th inst., the men going in on the employers' terms. The cause of the dispute was the appointment of an English foreman, whose dismissal the men wanted.

Dryclough.—A new (R.C.) school-church, dedicated to SS. Aidan and Oswald, was opened on the 28th ult. at Dryclough, near Royton. The main room measures 66 ft. by 30 ft., and is approached by a porch containing the stairs of the gallery. A separate chancel, 18 ft. 6 in. by 15 ft., opens from the main room by means of large doors, 19 ft. by 6 ft. 9 in. each; and an infants' room, 30 ft. by 22 ft., having gallery accommodation for sixty children, is attached to the main building. The sacristy and class-room measures 18 ft. by 18 ft., and the boys' vestry 11 ft. by 11 ft. The accommodation for school-work is for 350 children, infants included, and for Divine service for about 500 worshippers. The rooms are all lofty, and have stained and varnished open-timbered roofing throughout; and, to enhance the comfort of the rooms, the roofs are boarded and covered with felting under the slates. The style is described as a free treatment of English Gothic. The windows are glazed with quarry lead lights. The altar is in carved oak, from a design supplied by the architect, and has been executed and fixed by a Dutch firm, Messrs. J. A. Orr, of Roermond. The building works were entrusted to the following local firms, viz.:—Brickwork, Mr. Thos. Whittaker; masonry, Messrs. J. Hirst & Sons and Mr. P. Walsh; joinery, Messrs. R. Hilton & Sons; plumbing, painting, and plastering, Mr. M. J. Hearne; slating, Mr. J. Bamford; and benching, Messrs. S. Ashton & Sons. The whole has been carried out from the designs and under the superintendence of Mr. Thomas Mitchell, architect, of Oldham. The cost will amount to about 2,200*l.*

Burnham Westgate.—St. Mary's Church, Burnham Westgate, Norfolk, has been reopened, after restoration. The chancel has been nearly rebuilt and provided with a new roof, Minton tile pavement, new window, carved oak seats, and other fittings. In the church the old chapel of St. John has been restored with new lead roof, well lighted, opened to the north aisle by a new archway, and fitted with open seats. The nave and aisles throughout are repaved with Minton tiles, and supplied with open seats of pitch-pine, a carved oak pulpit and reading-desk, and additional windows, with a thorough repair of all the stonework. The cost of the works has been about 750*l.*; some work still remaining to be done to the tower and porch is estimated to cost 120*l.* The restoration was under the direction of Mr. Phipson, architect, Norwich, and executed by Messrs. Dew, the builders; Mr. Alfred Beavor, stonemason; and Mr. W. Witton, plumber and glazier, all of Burnham.

The Builders' Ball.—The annual ball in aid of the funds of the Builders' Benevolent Institution is announced to take place on Thursday, January 27th. We trust that it may be as successful as the recent anniversary dinner proved to be. Those of our readers who are willing to do their part in attaining the desired end should communicate with Mr. F. W. Keeble, the honorary secretary for the Builders' Ball, 4, Vernon-place, Bloomsbury-square.

Royal Asylum of St. Anne's Society.—An Old Boys' Club in connexion with this noble charity is now organised. All Old Boys desirous of joining or aiding the movement are requested to communicate with Mr. John G. Adams, at 69, Cook's-road, Kennington Park, an ex-scholar, who has undertaken to receive all names.

TENDERS

For the erection of a new brewery (exclusive of offices and brewery plant) at Walham Green, for Messrs. Stansfeld & Co. Mr. William Bradford, architect and engineer. Messrs. J. & A. E. Bull, surveyors:—

Smith & Co.	£21,760	0	0
Lucas Bros.	21,528	0	0
Holland & Co.	21,374	0	0
Trollope & Son	21,048	0	0
Higgs & Hill	20,898	0	0
Bywaters*	20,210	0	0

* Accepted, subject to modification.

For the erection of warehouses and printing-offices, Shelton-street, Drury-lane, for Messrs. Henry Hansard & Son. Mr. Octavius Hansard, architect:—
Mitchell & Co. (accepted).

For the re-erection of premises, and dilapidations, No. 11, Berwick-street, Oxford-street, for Mr. Francis Pinn. Mr. John H. Swann, architect:—
Mitchell & Co. (accepted).

For a mission-house, Brunswick Park, East Barnet, for Mr. J. L. Wood. Mr. S. C. Capes, architect. Quantities not supplied:—

Garratt (accepted)	£560	0	0

For shops, Peckham-road:—

Taylor & Parfitt (accepted)	£2,835	0	0

For five houses and shops, Brixton-road, for Mr. Earle Bird. Messrs. Fowler & Hill, architects. Messrs. Fowler & Hugman, quantity surveyors:—

Hook & Oldrey	£8,644	0	0
Freight	8,600	0	0
Forrest	8,487	0	0
Lang & Son	8,165	0	0
Maxwell Bros.	8,130	0	0
Taylor	7,987	0	0
Kirk & Randall	7,805	0	0
Colls & Sons	7,573	0	0
Conder	7,398	0	0
Nicholls	7,331	0	0
Higgs	7,328	0	0
Pack Bros.	7,195	0	0

For the sewerage of Beeston, Notts. Mr. John Jackson, engineer. Quantities by Messrs. Hovenden, Heath, & Berridge:—

Roberts & Watson	£13,430	0	0
Meats Bros.	12,670	0	0
Knight	11,359	16	0
Cordon	11,264	0	0
Kellett & Bentley	11,224	0	0
Botterill	10,733	0	0
Rayner	10,497	0	0
Cook & Bennett	10,473	0	0
Bell	10,395	0	0
Smart	10,222	10	5
Ridal & Arnison	10,079	15	9
Johnson	9,897	0	0
Dawson	9,715	0	0
Young & Nicholson	9,619	0	0
J. & G. Tomlinson	9,395	0	0
Bromage	8,970	0	0

For the erection of a new brewery at Portslade, near Brighton, for Messrs. J. Dudney & Sons. Messrs. Scamell & Colyer, architects. Quantities by Messrs. Curtis & Sons:—

Contract No. 1.—*Building.*

Grimwood & Sons, London	£9,698	0	0
Morter, London	9,200	0	0
Colls & Sons, London	9,190	0	0
Patching, Brighton	9,069	0	0
Chappell, London	8,980	0	0
Brown, London	8,820	0	0
Parsons, Brighton	8,800	0	0
Smith & Sons, Islington (accepted)	8,145	0	0

Contract No. 2.—*Ironwork.*

Westwood, Bailey, & Co., Poplar	£2,532	11	3
Handyside & Co., London	2,229	19	4
Cochrane & Co., London	2,176	10	0
Moreland & Sons, London	2,150	7	0
Thornewill & Wareham, Burton-on-Trent (accepted)	1,990	0	0

For the erection of the new church for the parish of St. Lawrence, in the city of York, exclusive of the tower and carving. Mr. John Green Hall, architect:—

Brelsford	£9,500	0	0!
Bowers	9,300	0	0
W. & J. Crow	8,337	0	0
Osbourne	8,187	17	2
Weatherley	8,063	0	0
Williams	7,930	0	0
Hebden	7,826	0	0
Morton	7,745	0	0
Roberts & Watson	7,200	0	0
Bellerby	7,135	0	0
Whittaker Bros.	7,000	0	0
Padbury & Sons	6,987	0	0
Barry	6,898	0	0
Lyons	6,584	0	0
Burton	6,530	0	0
Creaser	6,495	0	0
Simpson	6,336	0	0
Dennison	6,250	0	0
Bowman	6,220	0	0
Bingham	6,177	0	0
Clark	6,173	0	0
Kilvington	6,070	0	0
Keswick & Sons (accepted)	6,015	0	0
Boulton	5,950	0	0!

For new shop-front, for Mr. J. Collier, at Chepstow-road, Newport, Monmouthshire. Mr. H. A. Goodman, architect:—

Jones & Son	£173	9	0
Morgan	170	0	0
Moulton & Brownscombe (accepted)	153	19	0

For the erection of new shop on forecourt, with rooms over, and additions at rear, Nos. 186 and 188, Southwark Park-road, Bermondsey, for Mr. E. T. Swales. Mr. E. Crosse, architect:—

White (accepted)	£350	0	0

For sundry works required to be done in fitting up Dungannon Hall, Knightsbridge, for the United Service Provision Market Company (Limited). Mr. Edward Witts, architect. Quantities not supplied:—

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"Mysteries of Figures" (a pile of letters received on this subject).—"Bricks" (the terms are too open to constitute a contract).—E. F. A. (if communication be sent, it shall have attention).—W. P. (next week).—W. P. G. (next week).—G. G. (next week).—B. A. (received).—H. F.—C. S. B.—J. & T. T.—W. H.—M. & Co.—J. S. G.—C. B.—S. J. D.—B. & S.—P. & F.—C. S. B.—J. S.—"Wood-Brick."—J. B.—W. A. S.—M. Y.—T. B.—T. E. P.—J. W. W.—C. G. & Co.—B. T. B.—F. H.—Prof. V.—J. C. M.—H. H.—H. L.—J. & A. B.—C. B. B.—J. D.—E. G.—"Handbuch der Architektur."—J. T. C.—W. B.—J. G. H.—A. S. J.—S. & Co.—H. L. V.—W. G.—H. J. I.—J. W.—S. & C.—S. Bros. & Co.—A Competitor.—C. F. H.—C. G.—H. W.—W. B.—J. C.

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We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course with the authors.

SPECIAL NOTICE.

Christmas Week.—*The* Builder *for the week ending December 25th will be published on* **Thursday, 23rd** *inst., at the usual hour.*

Advertisements for insertion in that issue must therefore reach the Office before Three o'clock P.M. *on* **Wednesday, 22nd** *inst.*

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Addressed to No. 46, Catherine-street, W.C.

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The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

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